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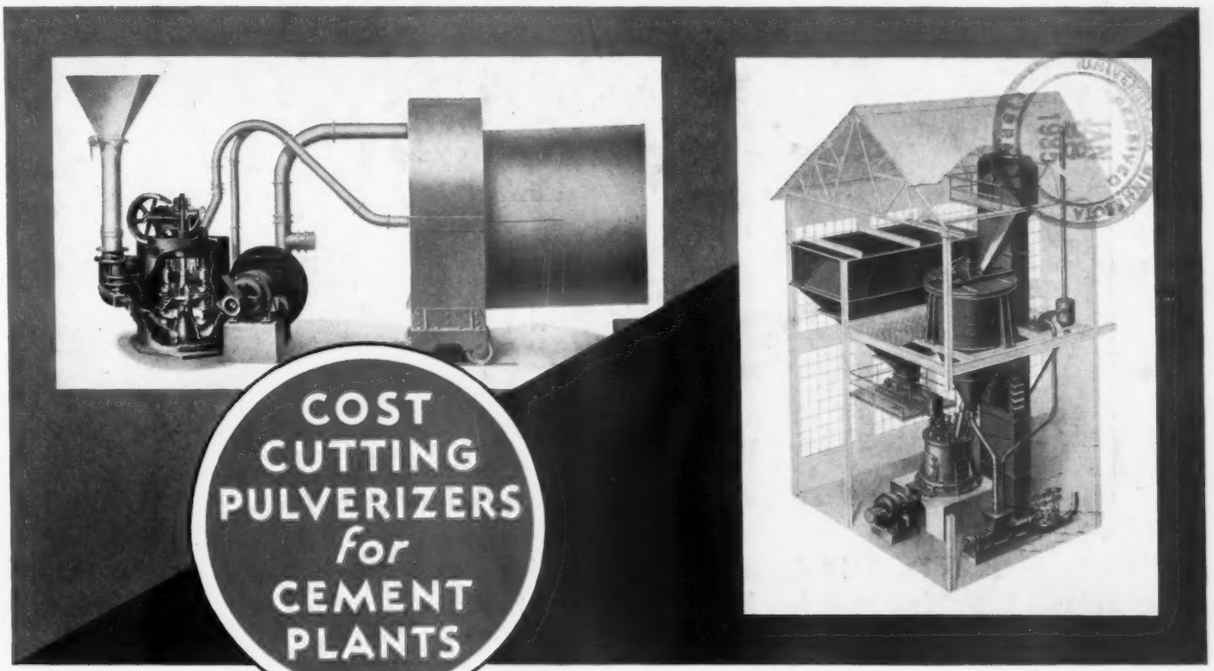
Rock Products

and

CEMENT and ENGINEERING NEWS (Est. 1896)

THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY



COST CUTTING PULVERIZERS *for* CEMENT PLANTS

Three-fold savings in the cost of manufacturing cement can be effected through the installation of Babcock & Wilcox Type B Pulverizers.

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The economy of direct-firing kilns can be extended by using B&W Type B Pulverizers. Coal and power consumption is reduced and driers eliminated . . . the coal is dried by preheated air in the pulverizer.

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Savings of 50 per cent in the cost of raw-material grinding, and 30 per cent in that of clinker grinding, as well as comparable savings in labor and maintenance can be effected through the use of B&W Type B Pulverizers.

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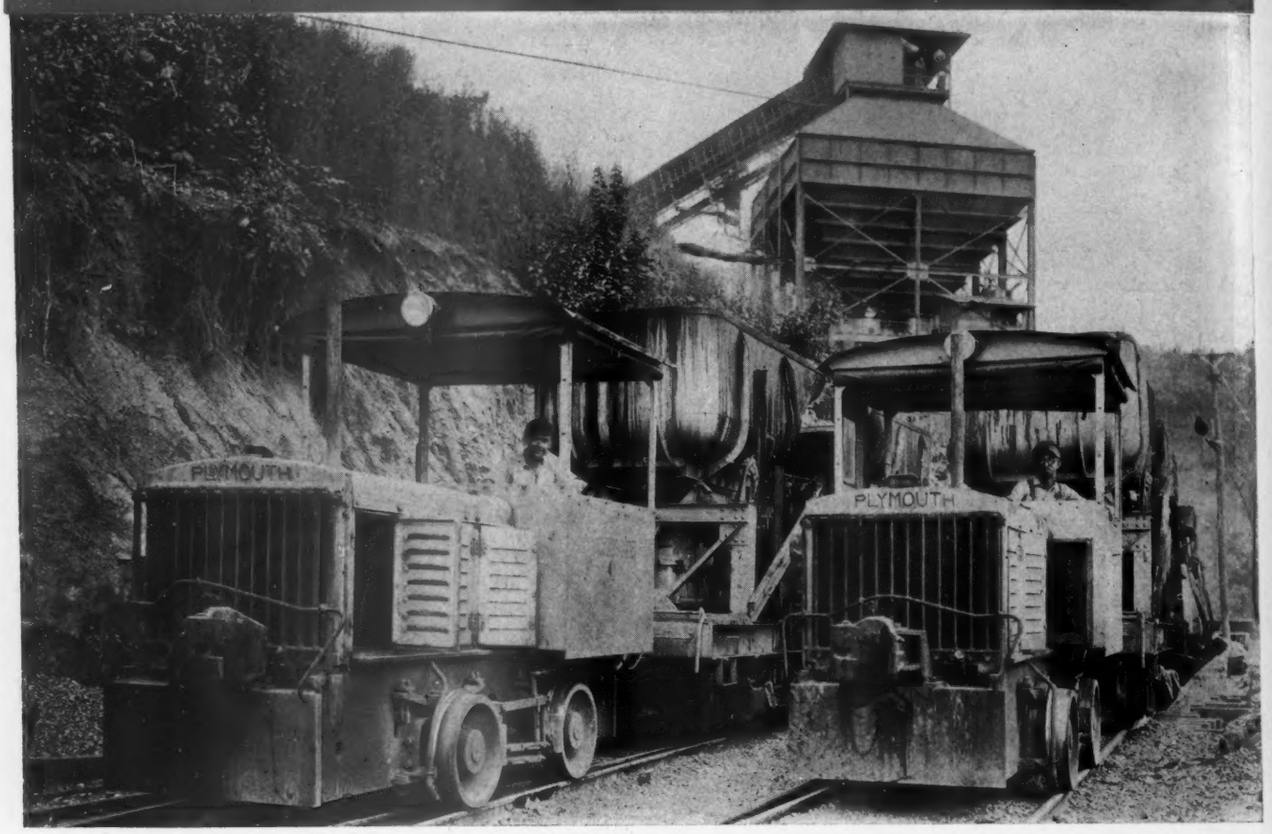
WRITE FOR THIS 16-PAGE BOOKLET

BABCOCK & WILCOX

TVA buys FOUR PLYMOUTHS for NORRIS DAM·



NORRIS DAM will be 210 ft. thick at the base, 212 ft. high to the crest of the spillway. Still forty feet higher will be a 22-ft. roadway to be completed in 1936, at a cost of $35,000,000.00.

The mixing plant in rear contains three 3-yd. concrete mixers. Each Plymouth hauls one car containing two 3-yd. buckets. Each car is hauled 500 ft. where the contents of both buckets are dumped into a traveling 6-yd. bucket. A cable then transfers this bucket to the concrete forms of the dam proper where the material is dumped. The bucket is returned and the operation is repeated.

Four Plymouths are used. Service is maintained 24 hours a day.

PLYMOUTH » GASOLINE » » DIESEL » GAS ELECTRIC DIESEL ELECTRIC LOCOMOTIVES

PLYMOUTH LOCOMOTIVE WORKS, PLYMOUTH, OHIO, U. S. A.

Good Roads

CHAMPION ROLLER BEARING CRUSHERS

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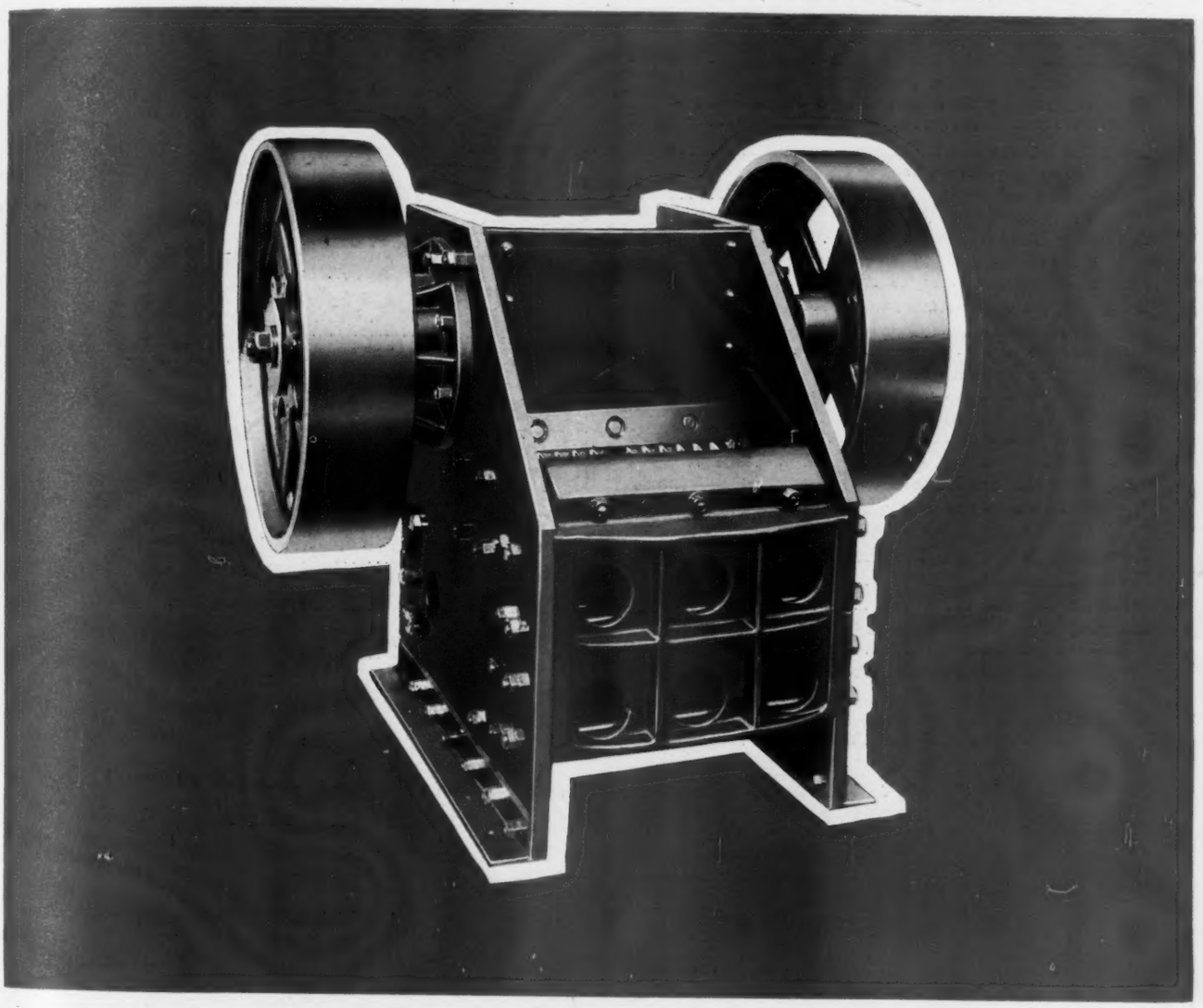
LARGE JAW OPENINGS — **LONG CRUSHING JAWS**

Accomplishing a dual purpose — for Primary or Secondary crushing with maximum efficiency — in One Unit, whether feeding one-man stone or used for fine reduction.

"There's Fifty Years of Crusher Building Experience behind every 'Good Roads' Champion!"



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KENNETT SQUARE, PENNA.

ELEVATORS CONVEYORS ROTARY SCREENS VIBRATING SCREENS

Good Roads

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Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

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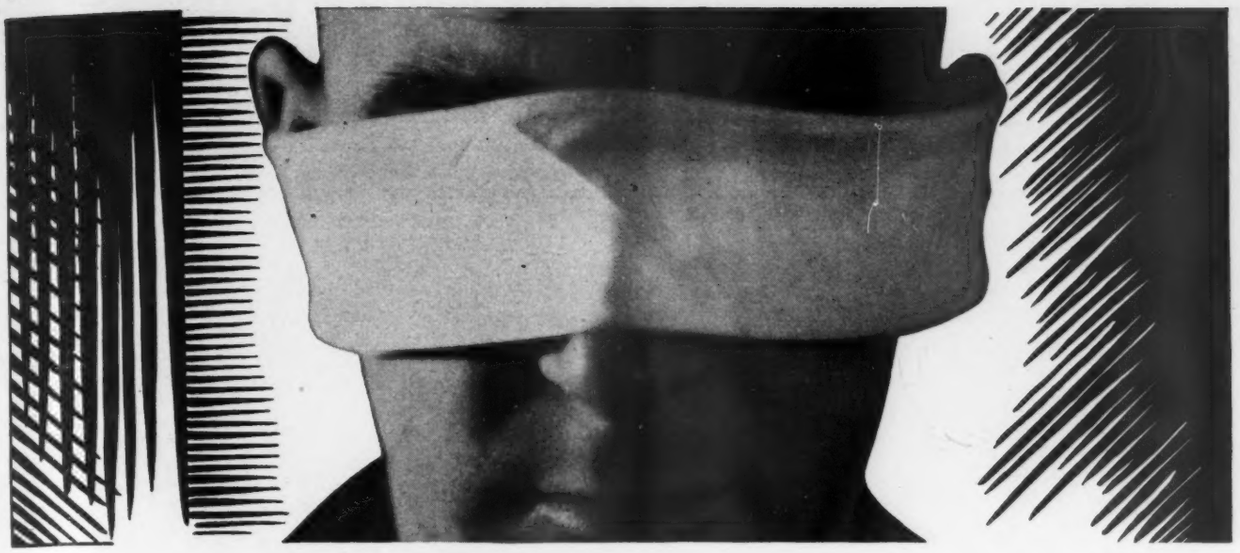

You can't SEE the REAL DUST PROBLEM

PARTICLES so small as to be invisible, measuring perhaps 10 microns (a micron is .00003937 inches) constitute a real dust problem. These cause numerous respiratory diseases, a matter which should cause any operator of any plant where dust exists in any form—to do some serious thinking.

Ordinary dust removal systems may be satisfactory in carrying off the larger visible particles from your operations, but this is not dust collection in an engineering sense nor will it reduce your liability.

The cloth filter type of dust collection system, the best example of which is the BLAW-KNOX FRAMED BAG DUST COLLECTOR, is the only final way to "lick" the dust problem—insure against industrial disease—satisfy legal requirements (many states have them) and keep down maintenance expense.

If you have any dust in any operation in your plant, write Blaw-Knox today.

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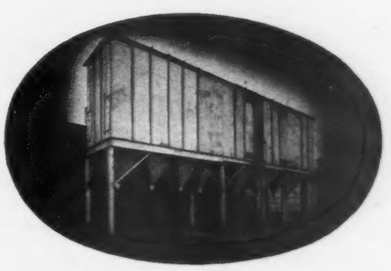


Blaw-Knox Framed Bag Dust Collectors. Muskegon Piston Ring Co., Muskegon, Mich.

Blaw-Knox Framed Bag Dust Collectors set in tandem. Perfect Circle Co., Hagerstown, Ind.

BLAW-KNOX

STEEL FRAMED BAG DUST COLLECTORS

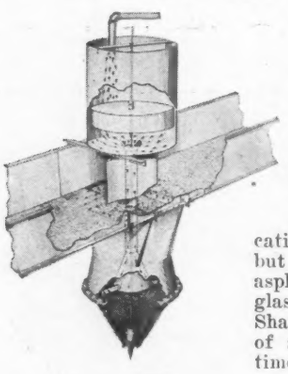
LINK-BELT

DEVOTED TO BETTER METHODS OF HANDLING

PUBLISHED BY LINK-BELT COMPANY, CHICAGO, PHILADELPHIA,

Panoramic view of McGrath Sand & Gravel Co.'s newest plant at Chillicothe, Illinois, equipped with Link-Belt digging elevators, belt conveyors, inclined conical screens, vibrating screens and Shaw classifiers. Since 1912 Link-Belt has designed, built and equipped 10 complete plants for this progressive producer, at Mackinaw, Chillicothe, Pekin, and Forreston, Illinois.

"A New Set of Sand Values



Has Been Created for Us by the Shaw Classifier," says the McGrath Sand & Gravel Co. in a recent advertising circular.

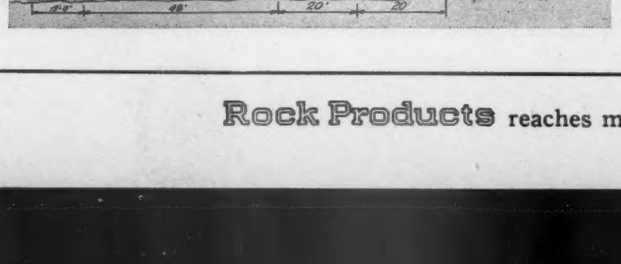
Probably no other sand classifier gives such accuracy of grading as this unit. It will clean and classify to a degree that will meet the most exacting specifications—not only commercial sand, but will make special grades such as asphalt, filter, engine, gypsum and glass sand. By using a series of Shaw classifiers two or more grades of sand can be made at the same time, or mixed into any combination.

Iowa Producer Adds Sand Blending Facilities

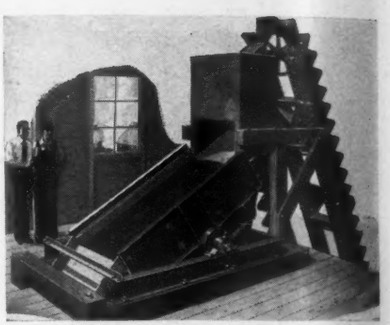
Changing specifications calling for accurate proportions of graded materials used on various government projects, are causing operators to revamp their classifying, screening, handling, and blending systems.

The Northern Gravel Company of Muscatine, Iowa, added facilities, as illustrated below, to meet the new specifications for sand on Mississippi River lock and dam construction. This installation consists of the addition of Shaw Classifiers with some rearrangement of bin facilities, conveyors, etc.

This permits the separation of sand into three distinct gradations and combinations of these. Almost any combination of sand grades that reasonably may be expected, can now be produced quickly and economically.



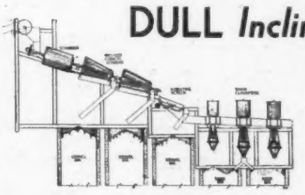
Which Type of Screen?



The Vibrating Screen

for greatest accuracy in screening and sizing. The "PD" (Positive Drive) type is particularly well adapted to handle the larger sizes of gravel, stone, and such sticky materials as damp sand, slag, etc. The "NP" (Unbalanced-Pulley) type is especially effective in the careful screening of borax, cement, clay, gypsum, lime, sand, small gravel, crushed stone, etc. A fully enclosed housing can be provided, when required, where the material is of a dusty nature.

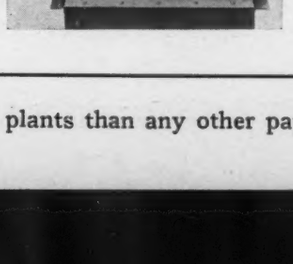
DULL *Inclined Conical Screens*



Still foremost in sand and gravel washing and sizing. Their many advantages and conspicuous success over a period of more than 20 years are known wherever sand and gravel is prepared.

Other Types of Screens

The 60-in. diameter trunnion type scrubber screen illustrated below is one of a number of types of revolving and cylindrical screens which are available in various sizes and capacities to meet almost any condition.



The rotary disc-grizzly (bottom left) is very efficient in the screening or "scalping" of large size materials such as stone, etc. It handles the material gently, has large capacity and in many instances is used where the cylindrical revolving screen formerly would have been employed. The disc shafts operate in the same direction but have different and successively higher speeds.

Rock Products reaches more plants than any other paper

NEWS

AND PREPARING MATERIALS

INDIANAPOLIS, ATLANTA, SAN FRANCISCO, TORONTO 5180

Becker County—Shiely Co. Builds Unique Plants for Producing Gravel Fill for Ft. Peck Dam

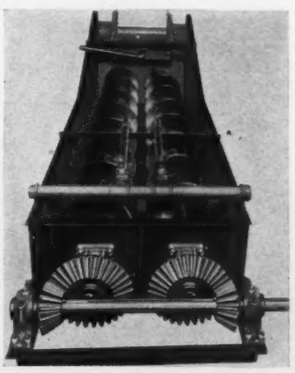
The above illustration shows one of the two Link-Belt portable gravel screening and loading plants for this project. These plants produce and load into cars, the gravel for toe of earth-filled dam being built at Ft. Peck, Montana. The sand is screened out and returned to pit, the oversize being delivered to trucks for disposal. Capacity of each plant, 550 tons per hour of pit run material.

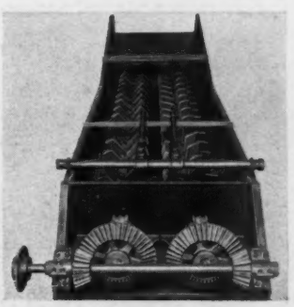
Selecting the Correct Scrubbing and Washing Method

A preliminary scrubber of this type, in combination with Dull inclined conical screens, will frequently clean many materials better than the more expensive types of scrubbers. It consists of a solid cylindrical shell with interval retaining rings, dividing the length into compartments which retard the progress of the material through the scrubber, while lifting vanes raise and drop the material into a bath of water.

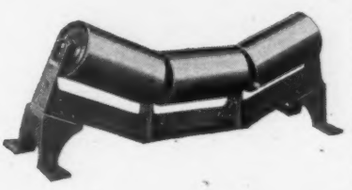
Log and Screw Washers

The Screw Washer is frequently used on both gravel and stone for breaking clay or dirt that cannot be broken up in a revolving scrubber. Some varieties of clay will form into balls in a revolving machine, but can be broken up by a screw washer because of the grinding action of the stones on each other. The paddle or log washer is similar to the screw washer except that the action is more violent in the paddle washer. The Link-Belt screw washer is made with heavy hollow shaft on which are mounted the flights with hardened steel wearing shoes.
The log washer is similar in construction, except that it is usually made with renewable manganese steel paddles mounted on a hollow square shaft.





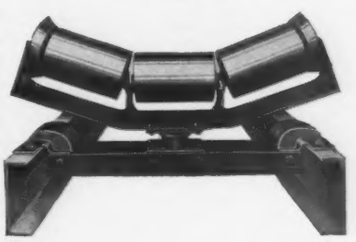
Assuring Long Life of Belt Conveyors



The essentials to economical belt conveyor service are all embodied in the Link-Belt line of anti-friction belt conveyors. Special attention has been given to the idler, the most vital part of the belt conveyor. Send for complete engineering data book No. 1615.

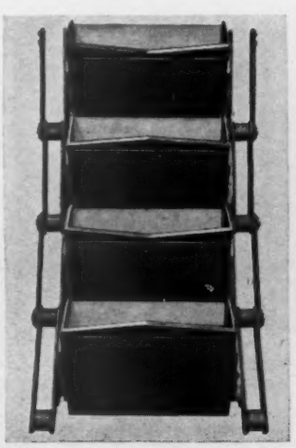
The Self-Aligning Idler

The self-aligning idler is designed to operate automatically in guiding the belt to a central position on the carrying idlers at all times, whether running loaded or empty. It avoids using side guide rolls, with their danger of injury to the edges of the belt in case of mis-alignment.



Bucket Elevators

Three general types of bucket elevators are adaptable to the work of raising materials at gravel and stone plants. These are (1) the continuous bucket elevator; (2) the centrifugal discharge elevator, and (3) the digging elevator. Link-Belt makes the complete line of all three types for every capacity and service condition.



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THE LOAD ROLLS ALONG . . .

on the free rolling Rex-Stearns Timken Belt Idlers.

Here are 2,000 gross tons per hour, rolling along at 650 feet per minute on Rex-Stearns Timken Idlers—uphill for 147′ vertical lift.

Low cost of maintenance, low cost of attendance, and low-cost lubrication—(Dust stays out—Grease stays in)—made the Rex-Stearns Timken the preferred belt idler.

For long life and low cost per ton of handling—Standardize on Rex-Stearns Timken Idlers.

How to Handle It

"How to Handle It" is the name of a new book on conveying. It shows how many plants have applied Rex-Stearns Timken Idlers and other forms of Chain and Belt Conveying. If you are interested in any phase of Bulk Handling or Conveying, this book will interest you. Write for your free copy.

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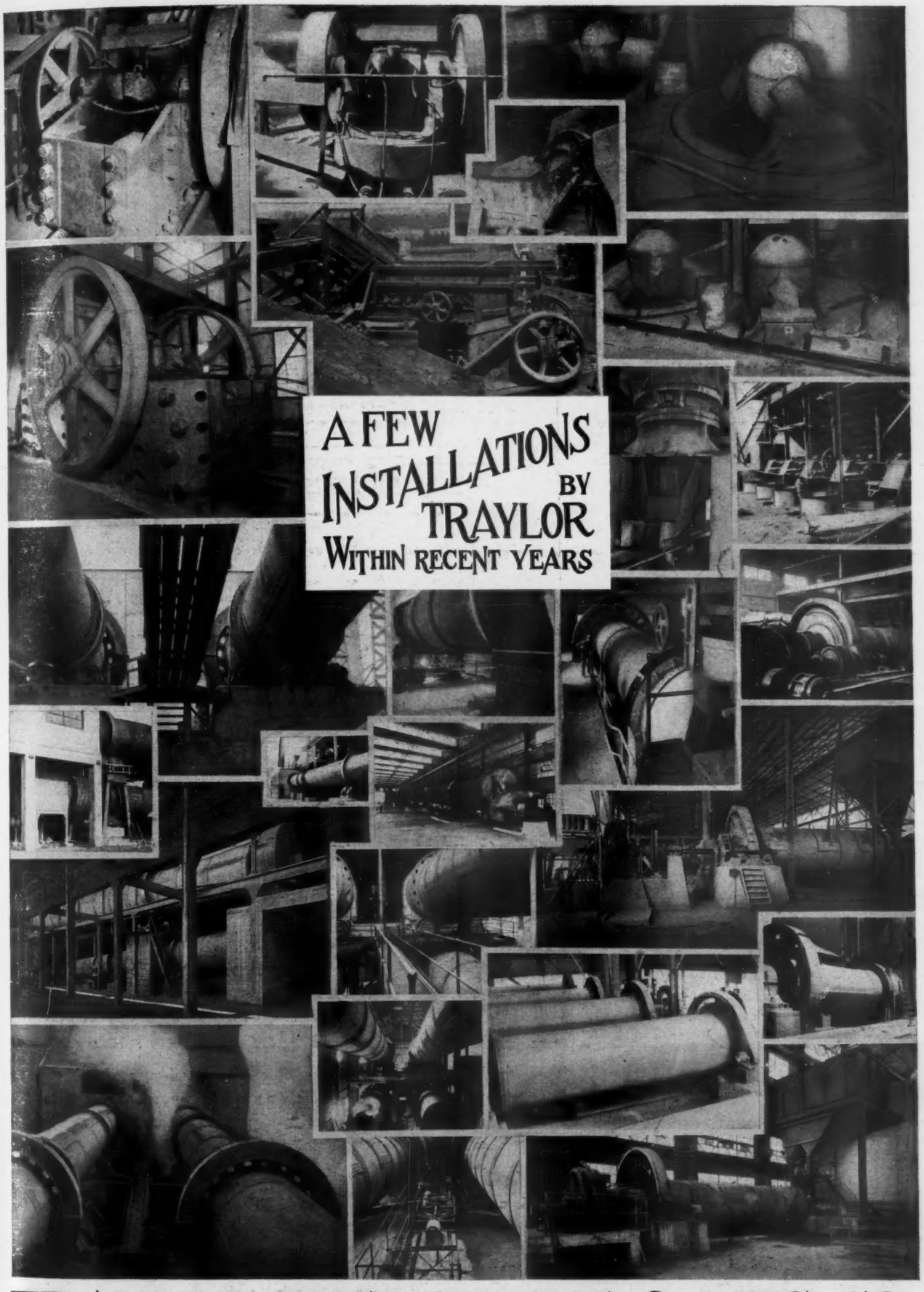

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450 Tons An Hour Is

Screen Certainty

When Right *Bearings Are Used*

● SKF makes practically *all types of anti-friction bearings.* When SKF recommends a particular type of bearing, therefore, you may depend upon it; its recommendations are *unbiased!*

SKF-EQUIPPED **BUILT BY SIMPLICITY ENGINEERING CO.**

"The Simplicity Engineering Company has pioneered and developed many important features in equipment for the screening industry," says Simplicity. And what Simplicity says of screens, SKF can say of bearings . . . for both blazed new trails.

This 4′ x 16′ Triple Deck Simplicity Gyrating Screen, for instance, handles up to 450 tons of gravel in five sizes per hour. Yet its two individual motor-driven shafts depend upon four SKF Spherical Roller Bearings on the eccentric positions, and in its outer main bearings are four SKF Cylindrical Roller Bearings.

So it is a matter of progress that builders of pioneering equipment turn to bearings that were first in the field. For SKF don't need adjustments. They require oil or grease only a few times a year. And *they keep going.* There is always one way to bring your equipment up to the highest standards, specify SKF!

SKF
BALL AND ROLLER BEARINGS 3333

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"PENNSYLVANIA"

PENN-PRIMARY *STEELBUILT*

HAMMERMILLS combine the Primary and Secondary reductions of shovel size Cement-Making Materials in one dependable Crushing Operation, to the fineness required for efficient Grinding.

The **PENN-PRIMARY** Up-Running Incremental Reduction Design (patented), incorporated in Massive Unbreakable Steel Construction, avoids the heavy power surges and enormous crushing strains, inherent to instantaneous "pinchpoint" primary reduction.

With its Dump Hopper, Feeder and Motor, the **PENN-PRIMARY** Hammermill constitutes a complete and compact Crushing Plant for the modern Cement Mill, and for preparing Limestone for Aggregate and Road Material.

Savings in Equipment, Foundation, Building and Material Handling Costs, effect SUBSTANTIAL SAVINGS in total Raw Side Crushing Cost.

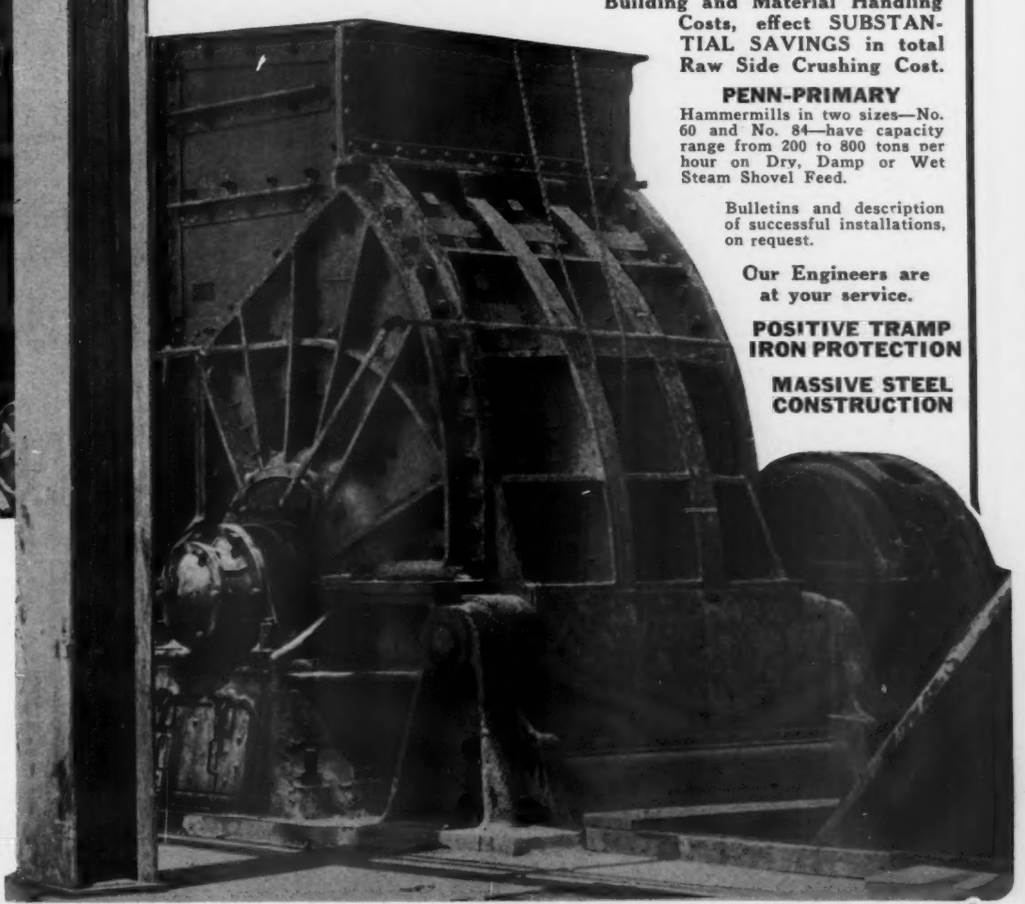
PENN-PRIMARY
Hammermills in two sizes—No. 60 and No. 84—have capacity range from 200 to 800 tons per hour on Dry, Damp or Wet Steam Shovel Feed.

Bulletins and description of successful installations, on request.

Our Engineers are at your service.

POSITIVE TRAMP IRON PROTECTION

MASSIVE STEEL CONSTRUCTION



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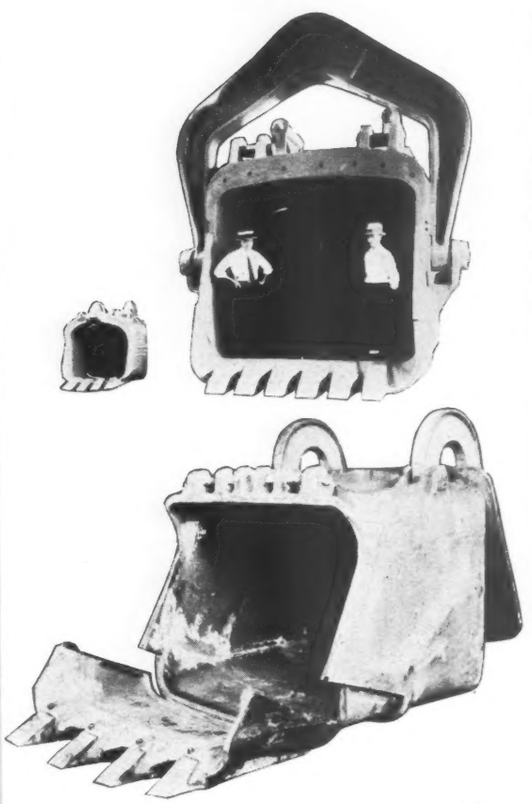
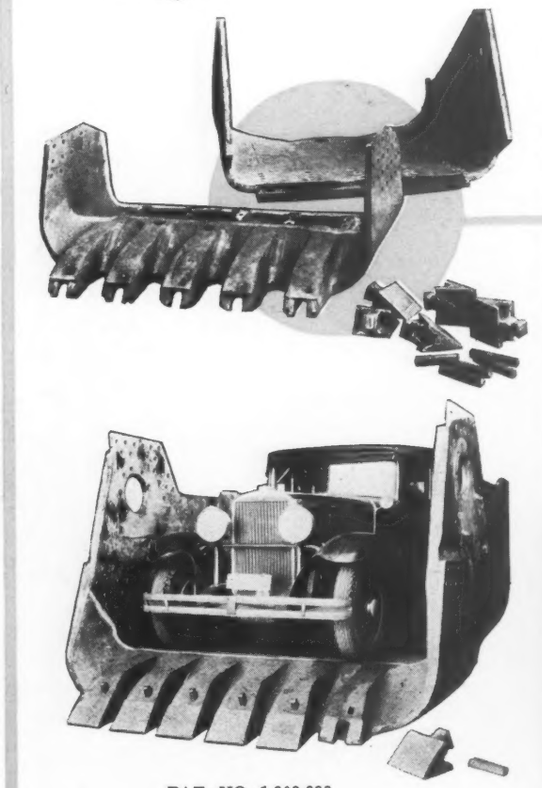
"Pennsylvania-Buchanan" Primary Jaw Crushers, (patented) six (6) sizes, Bulletin 5010—PENN-LEHIGH Primary Roll Crushers, (patented) six (6) sizes. Bulletin 2003—PENNSTEEL Secondary Single Roll Crushers, (patented) three (3) sizes, Bulletin 2004—Heavy Duty Secondary and Third Reduction Hammermills, (patented) fifty-nine (59) sizes, specialized for the Cement, Lime, Gypsum and Chemical Industries, Bulletins 1005-1022.

"PENNSYLVANIA" *STEELBUILT* Coal Preparation Machinery, Bulletins 3004-3005-2005-1004

STEELBUILT CRUSHERS

PMCO





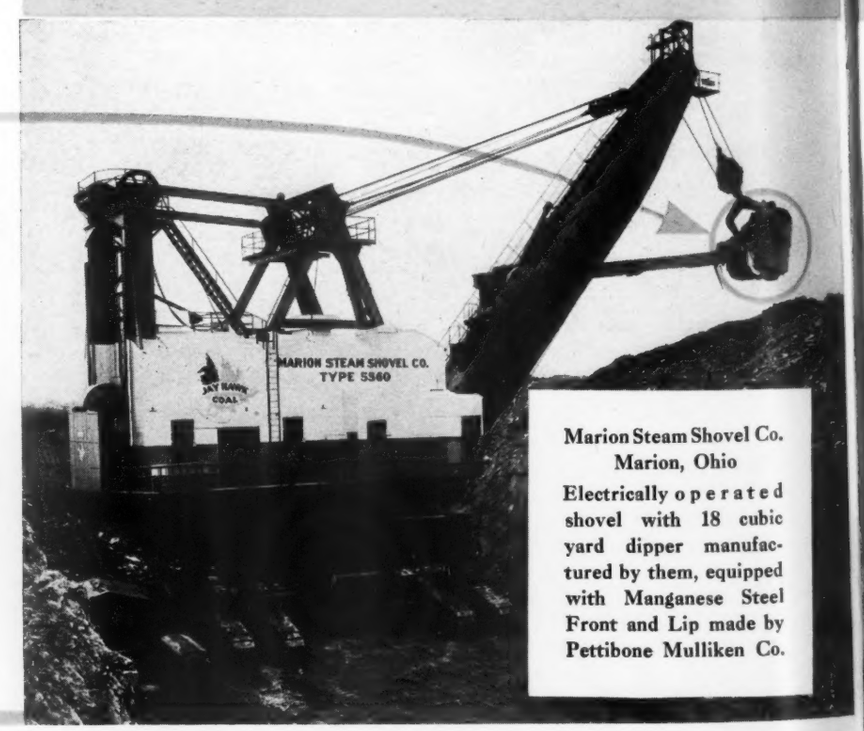
PAT. NO. 1,908,883

A New Type Dipper Front *with* Renewable-Interlocking LIP

For Power Shovel and Dredge Dippers and Dragline Buckets

A modern advancement in dipper front construction consisting of having an interlocking front and lip with dipper tooth bases cast integral, eliminating the use of separate bases, which reduce capacity and retard dumping, thus increasing efficiency and decreasing cost. The interlocking feature sustains and absorbs strains and shocks, relieving bolts or rivets of the load and stress. Renewals, when necessary, are confined largely to lip, which includes the bases, effecting savings and reducing cost of installation.

Many of these lips and fronts are in use—1¾, 2½, 6, 8, 12, 14, 18 and 20 cubic yard capacities. Whether your requirements call for a bucket of ⅜ cubic yard capacity or one of the largest ever manufactured, 20 cubic yard capacity, such as illustrated below, our experienced engineers will co-operate in the solution of your problem.



**Marion Steam Shovel Co.
Marion, Ohio**

Electrically operated shovel with 18 cubic yard dipper manufactured by them, equipped with Manganese Steel Front and Lip made by Pettibone Mulliken Co.

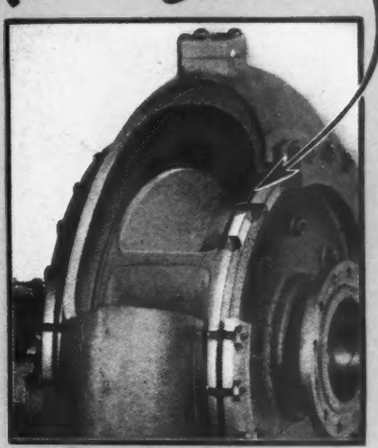
DIAMOND DREDGE PUMPS

featuring the New "Wear Resister"

These are sending profit curves to new heights for their owners while sending costs definitely lower.

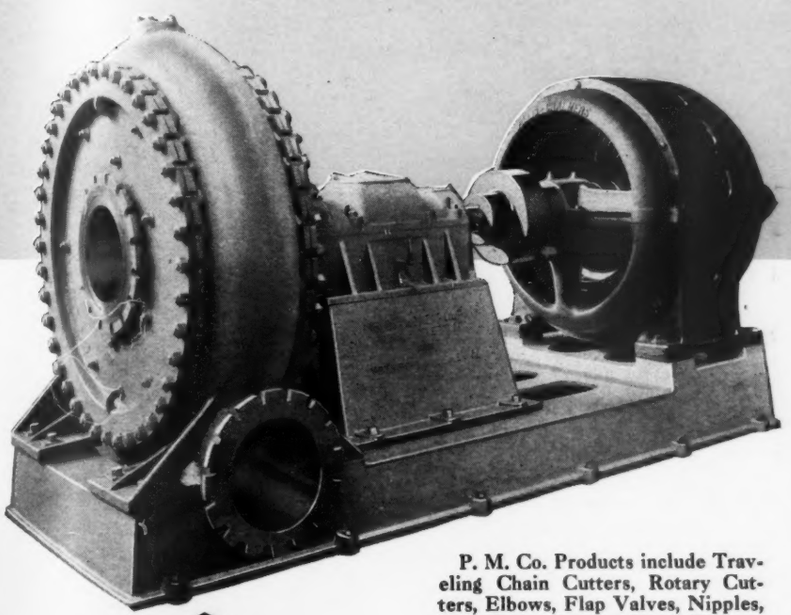
The new Pettibone Mulliken "Wear Resister" is responsible for this pump performance. This feature retards destructive abrasion by protecting pump shell, side plates and liners at vital points. It prolongs pump life, reduces repair costs, eliminates costly shutdowns and steps up production. It is truly the guardian of your profits. Diamond Dredge Pumps will be most appreciated where exceptionally severe conditions are encountered.

Write for Bulletin of the New Wear Resister and read how it may be applied to your installation.



PAT. NO. 1,947,148

- Prolongs Pump Life
- Reduces Costly Shutdowns
- Cuts Down Repair Costs
- Increases Production



P. M. Co. Products include Traveling Chain Cutters, Rotary Cutters, Elbows, Flap Valves, Nipples, Jaw Plates, Crusher Parts, Dippers, Dipper Teeth, Bucket Lips, Sheaves, and many other Manganese Steel Products. In addition we make alloy iron castings, carbon and alloy steel castings, forgings and special R. R. track materials.

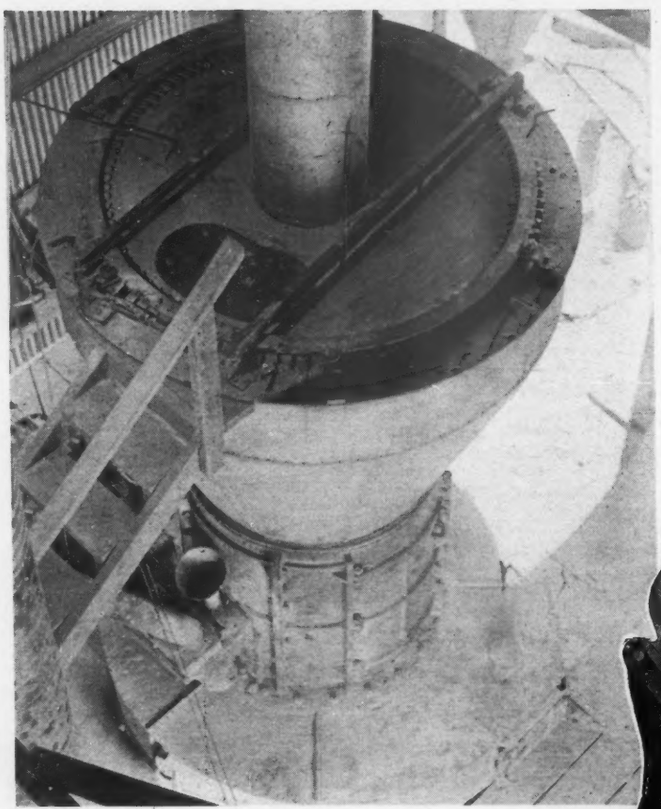
Diamond Dredge Pumps are made in all sizes to meet any operating requirement. Even though your dredge pump is not the new Diamond type, repair parts for all sizes can be furnished, made of Diamond Manganese Steel and incorporating the new "Wear Resister" principles.

DIAMOND

PETTIBONE MULLIKEN COMPANY

4714 DIVISION ST., CHICAGO, ILLINOIS

Williams Equipment will help pay 1935 Dividends



This Roller Mill and Air Separator materially reduces fine grinding costs.

Instantly changeable from 70% 100 mesh to 99.9+% 325 mesh.
Grinding Rolls operate on Ball Bearings.
Steel Castings (not cast iron) at important points.
Grinds Limestone, Gypsum, Coal, Mica, Rare Earths, etc.
Five popular sizes. Can be used as a Dryer Mill.
Let us tell you what it will cost per ton to grind your material.

Williams Hammer Crushers

eliminate needless operations, handle larger rock and lessen crushing costs.

It's easy to see how Williams Hammer Crushers cut crushing costs. Usually just one crusher does all the work reducing quarry run rock, whether power shovel or hand loaded, to commercial sizes in one operation. The "Mammoth" handles limestone as large as 4 ft., the "Jumbo" takes 14" to 24", and the "Jumbo Jr." crushes hand loaded stone. All sizes reduce to 2", 1¼", ¾" or smaller. Investment is cut 50% to 75% and crushing costs reduced 35% to 53%.

The Williams Patent Crusher & Pulverizer Co.
800 St. Louis Ave., St. Louis, Mo.

Chicago
37 W. Van Buren St.

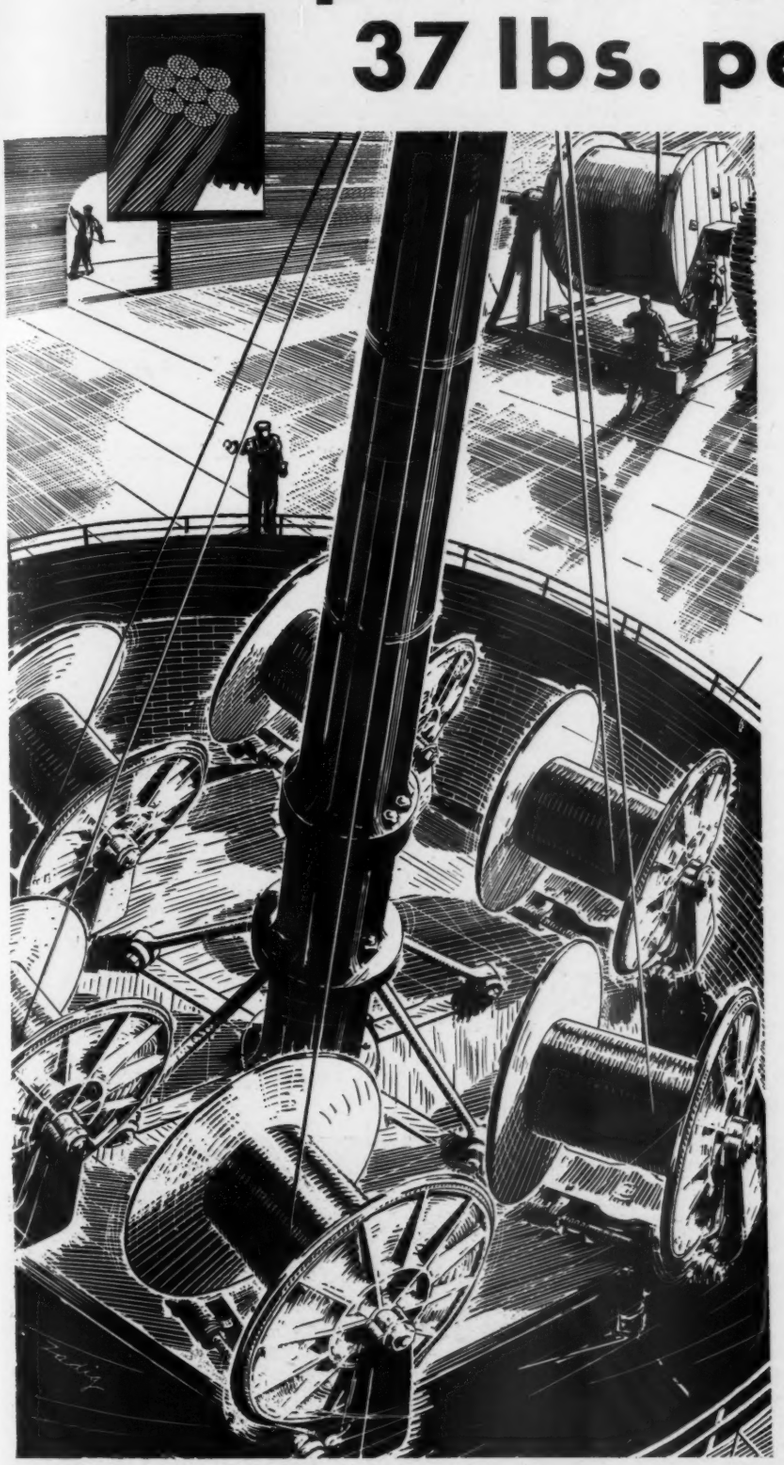
New York
15 Park Row

San Francisco
326 Rialto Bldg.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, MO. U.S.A. TRADE MARK
REG. U.S. PAT OFF.

Williams
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
PATENT CRUSHERS GRINDERS SHREDDERS

Rope that weighs 37 lbs. per foot!

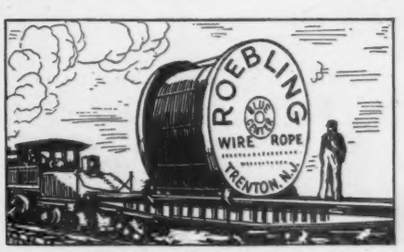


MADE BY WORLD'S LARGEST "ROPE-CLOSING" MACHINE

In rope diameter, the capacity of this Roebling machine is practically unlimited. It can turn out 80 tons of rope *in a single length* without reloading. A 4¾" wire rope, soon to be made by this machine, will weigh close to 37 pounds per foot! This "closing" machine is one of many of various types used by Roebling.

2525 MILES OF WIRE

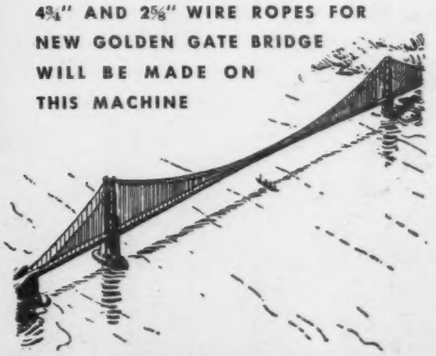
A single 8½ mile length of 1½" Roebling 6 x 19 wire rope, with a 7 x 19 independent wire rope center, such as could be produced by this machine without reloading, would contain 2525 miles of wire, approximately the air-line distance from New York to San Francisco.



61 TONS ON A SINGLE REEL

Drawn from actual photograph of a shipment of Roebling 1½" diam. Blue Center Wire Rope. The rope, made by the machine shown, is a *single* piece almost 6½ miles long.

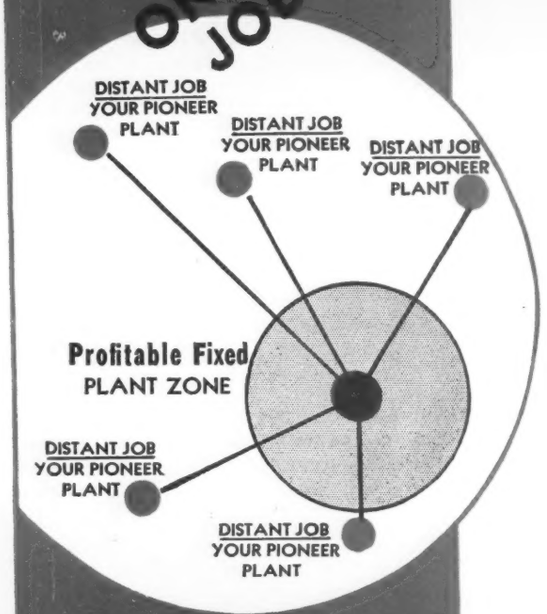
4¾" AND 2⅝" WIRE ROPES FOR NEW GOLDEN GATE BRIDGE WILL BE MADE ON THIS MACHINE



FOR YOUR PROTECTION: To make certain that Roebling Wire Rope will give the user the highest obtainable degree of safe, economical service, Roebling has left no stone unturned. It has enlisted the aid of the finest and most complete research, testing and manufacturing facilities. This rope-making machine is an example. John A. Roebling's Sons Company, Trenton, N.J. Branches in Principal Cities.

ROEBLING ...THE PACEMAKER IN WIRE ROPE DEVELOPMENT

CUT COST AND MEET ON YOUR JOB LOCATIONS WITH PIONEER



Shaded area represents main zone of profitable operation for fixed plant. Pioneer portable plants can be used profitably at job locations beyond the fixed plant zone.

Don't pass up the job because of distance. Enlarge your profitable trade area. Supplement your stationary plant with portable Pioneer equipment available anywhere you need it.

Pioneer Washing, Screening, Crushing and Loading Plants . . . Duplex Crushing Plants . . . Quarry Plants . . . Primary Breakers are some of the portable Pioneer equipment suitable to adequately take care of your local needs.

Pioneer engineers will recommend the ideal Pioneer "setup" or combination to handle your job. When the occasion arises, your Pioneer equipment may be readily moved to a new location in pit or quarry.

PIONEER GRAVEL

1513 Central Avenue

Highways Material Co. of Chicago, Ill., operating a 300-W Pioneer Washing Plant in a gravel pit near Lena, Illinois. On this job coarse aggregate and sand were produced in accordance with Illinois specifications, which require rejection of excess pea gravel. Plant produced ample tonnage to take care of requirements of 27E Paver.

COMPETITION

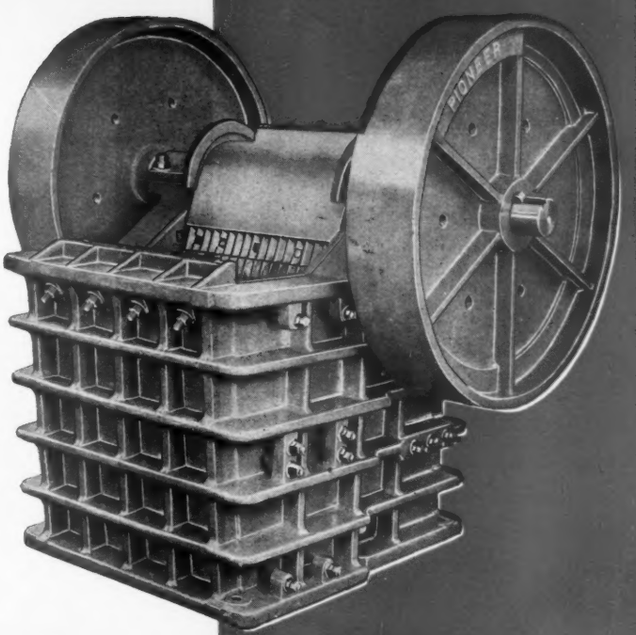
PORTABLE

EQUIPMENT

Pioneer equipment is all heavy-duty type, built to stand up under exacting conditions. A host of satisfied users are the best testimonial to Pioneer performance.

The Pioneer 300-W Washing Plant is an ideal auxiliary plant for commercial producers. It is a complete portable Washing, Screening, Crushing and Loading Plant, which will produce clean sand and two or three sizes of coarse aggregate simultaneously. It is designed to be used in pit or quarry on paving, dam and bridge jobs, which require small or large tonnage. It requires only suitable aggregate and water supply. See accompanying picture of 300-W Washing Plant operating in gravel deposit.

There are two types of Pioneer Jaw Crushers—roller bearing and bronze bearing. Sizes range from 24" x 36" primary breaker down to 9" x 16" Standard Jaw Crusher. Electric steel base; chrome nickel alloy steel shaft SKF bearings; overhead eccentric. Both stationary and movable jaws are reversible. Quick, positive adjustment of jaw opening can be made without shut down.



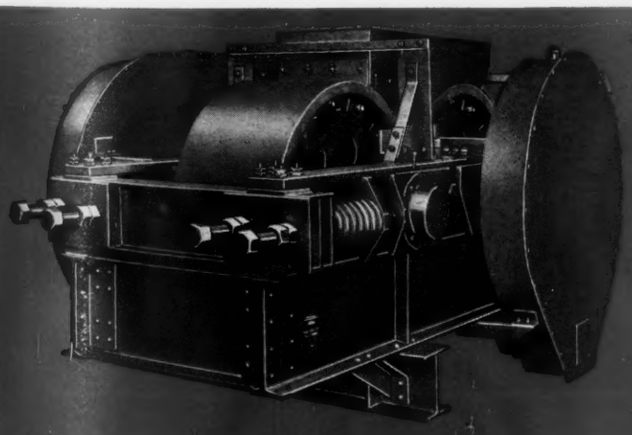
EQUIPMENT MFG. CO.

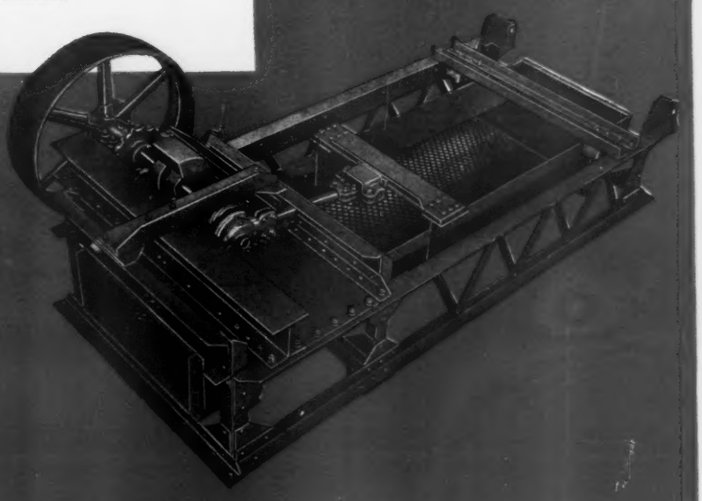
Minneapolis, Minnesota

Pioneer offers three types of screens —the shaker or horizontal screen, the revolving screen, and positive drive vibrating screen.
Here is No. 5 Pioneer anti-friction bearing screen. It is counter balanced and bearings are housed in dust-proof closures. The ideal screen when *close tolerances are required.*

40 x 20 Pioneer Roller Bearing Roll Crusher — gear driven; Timken bearings, 65 tons per hour capacity with 1" setting, crushing from 3" round.

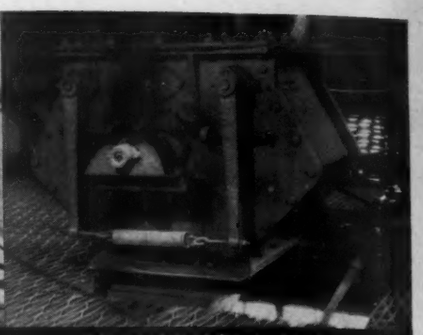
Pioneer equipment is readily installed in fixed plants. Foundation drawings furnished to show adaptability to fixed plant installation.





FULLER-KINYON PUMPS

CAR AND BARGE UNLOADERS

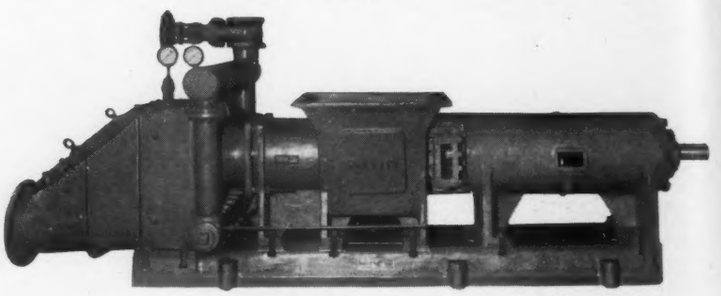


PULVERIZED MATERIAL FEEDERS

Fuller-Kinyon Systems

The remarkable power economy of the Type "H" Pump is due to automatically stabilized low pressure operation with low material velocities and maintained minimum material densities. The pump can be adjusted, while in operation, for the minimum power input under full capacity conditions. For lighter loads, as when one or more mills of a group is idle, a check valve automatically assists in maintaining a minimum seal density. If the pump is used under an open bin, such as car and truck hoppers, this valve prevents dusting when the feed is interrupted.

The screw shaft can be removed through a port in the check valve body without removing the bearings or disturbing their alignment. The bearings are automatically oil lubricated.



THE FULLER-KINYON TYPE H PUMP

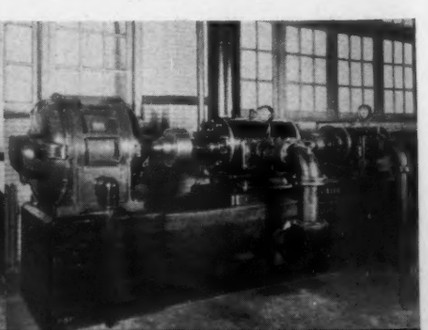
This new pump offers you unexcelled power economy in the handling of dry pulverized materials, with controlled efficient operation under light as well as full loads. These operating characteristics have definitely been established by a year of use in many classes of commercial service, preceded by exhaustive trials.

Fuller Company
CATASAUQUA, PENNA. U. S. A.

Chicago: 1118 Marquette Building.
Paris: E. Constantin, 105 Rue Lafayette.
Hamburg: Claudius Peters, Walhof, Glockengiesserwall 2.

CEMENT WEIGHING BATCHERS

AIRVEYOR PNEUMATIC CONVEYORS



COMPRESSORS AND VACUUM PUMPS

VULCAN

KILNS—HOISTS—LOCOMOTIVES, ETC.

are Profit Makers in the Cement and Rock Products Industry

KILNS, ETC. . . . . .

Rotary Kilns, Dryers and Coolers
Vertical Lime Kilns
Hydrators
Ball and Tube Mills
Special Process equipment

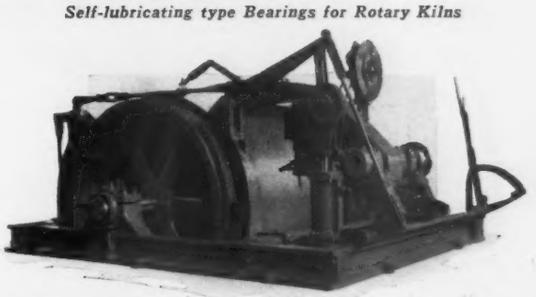
12-ton 115-H.P. standard gauge Gasoline Locomotive for National Portland Cement Co., Brodhead, Pa.

Self-lubricating type Bearings for Rotary Kilns

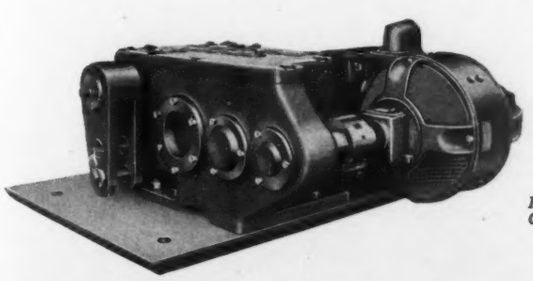
LOCOMOTIVES:

STEAM—all types —	10 to 90 tons	Diesel-Electric . —	10 to 100 tons
Gasoline Geared —	2½ to 40 tons	Trolley electric type—	4 to 50 tons
Diesel Geared . —	4 to 40 tons	Storage Battery type—	3 to 40 tons
Gasoline-Electric —	5 to 80 tons	Larry Cars	5 to 50 tons

A type and size to meet every industrial haulage requirement.



150 H.P. Single Rigid Drum Hoist built for The American Lime and Stone Company, Bellefonte, Pa.



ET-1 Shaking Chute Conveyor Drive.

HOISTS:

A complete line of Vulcan Electric Hoists are built in various designs and sizes for any hoisting job. They can be furnished with Vulcan Patented Safety Devices, manual or air operated brakes and clutches, sheaves or slope rollers to meet all requirements.

Room Hoists — Car Pulling Hoists
Scraper Hoists — Self-Contained Hoists
Heavy Duty Shaft and Slope Hoists

SHAKING CHUTE CONVEYORS:

Vulcan Electric Shaking Chute Conveyor for transporting hot or cold material up to 600 ft. with capacities from 20 to 100 tons per hour are available. Drives are totally enclosed and accessories designed for operating under the most severe conditions.

OTHER VULCAN PRODUCTS for the INDUSTRY

Moulded tooth gears . . . — . . .	Steel and iron
Machine cut gears . . . . — . . .	Steel and iron
Herringbone gears . . . . — . . .	Steel and iron

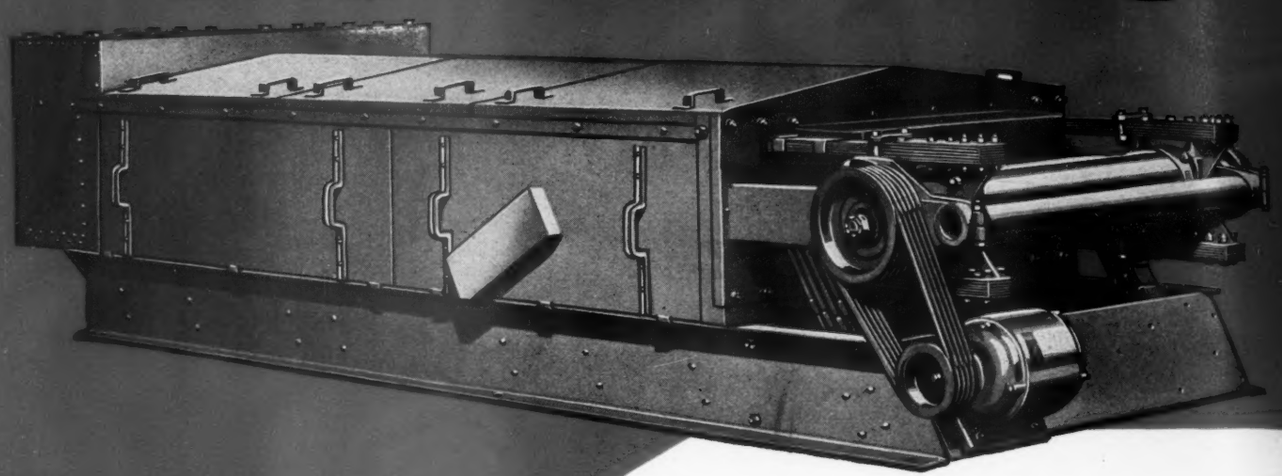
O. H. Steel castings
Plate metal work—riveted and welded construction.

VULCAN IRON WORKS

OF WILKES-BARRE, PENN'A., U. S. A.

Continuously in business since 1849

SYMONS SCREENS



For Hot, Dusty Screening

When screening hot or dusty materials, Symons Screens can be completely enclosed, yet the driving mechanism and motor are located outside of the enclosure and away from the heat and dust. When so enclosed, removable covers allow access to the screen, if desired. The driving mechanism is accessibly located out of the path of screened materials. This screen is ideal for hot, paving plants.

Other Features of

- **Close grading.**
- **Automatic feed.**
- **Easily Installed.**
- **Entire screen area has same movement.**
- **All bearings dust tight.**

Let Us Send You

NEW YORK CITY LOS ANGELES
60 E. 42nd St. Subway Term. Bldg.

NORDBERG

Set Level—Save Headroom

Symons Screens

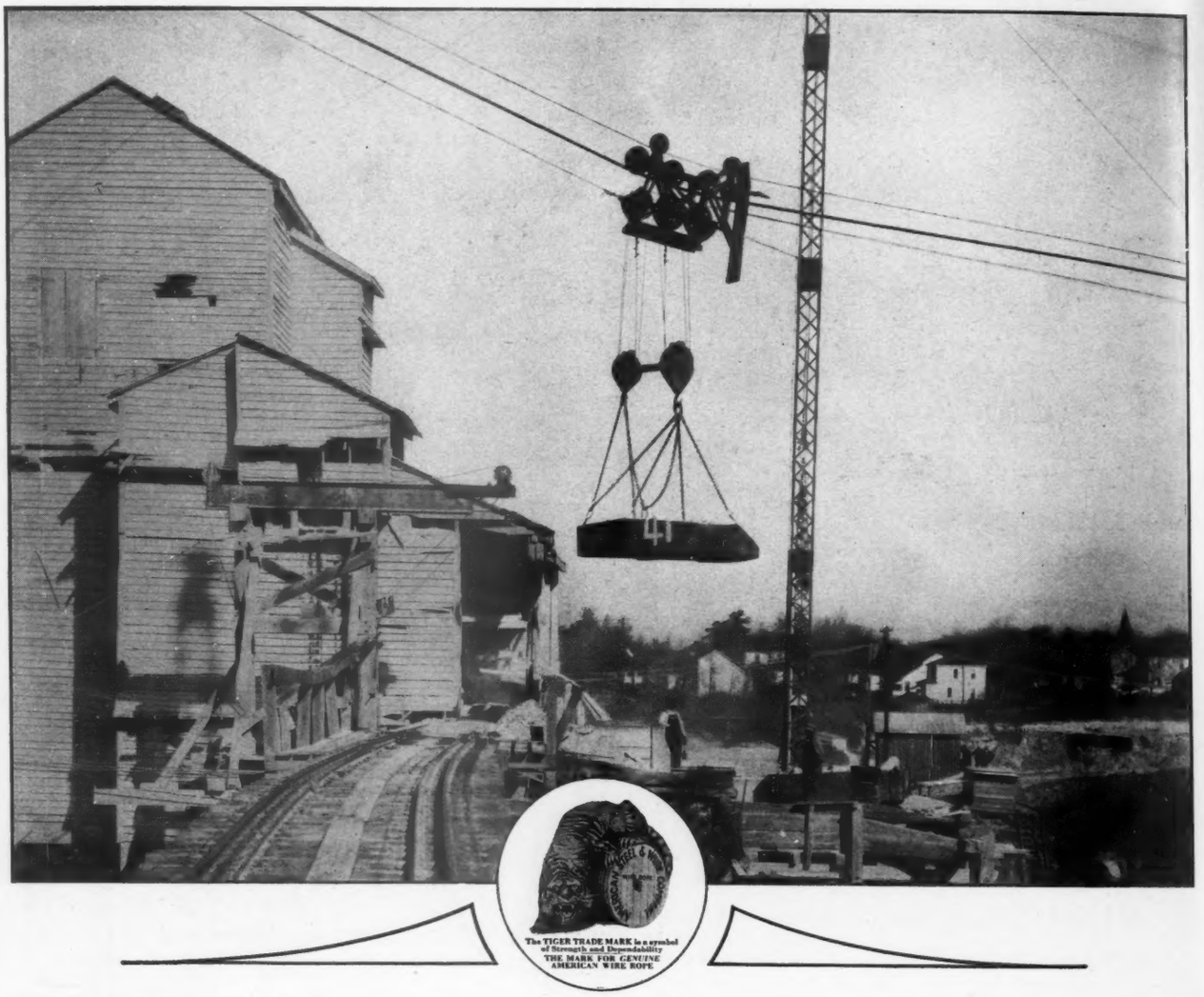
- **Weight of screen deck not carried on bearings.**
- **All vibrating parts are counterbalanced.**
- **No grinding action between material and cloth. Life of screen cloth greatly lengthened.**

Bulletin KR65

The advantages of a flat screen are readily recognized. Headroom is reduced to a minimum and is not increased regardless of the length of screen. Conveyors and elevators are shortened and installation costs are lowered. There is no bouncing or cascading along the deck, resulting in the most accurate grading. Here at last is the screen with the action and performance that producers of screened materials have long desired.

MFG. CO. MILWAUKEE, WISCONSIN — LONDON, WC2, ENG. BUSH HOUSE

IN PIT—IN AIR —ON SURFACE—



Wherever earth is moved . . . . . Wherever hard rope jobs exist, Wherever delays may be costly . . . And long rope-life is necessary

YOU will find it worth your time to allow our engineers to work with you in planning and supplying your wire rope needs. For different jobs—different ropes—but all carefully engineered to give service beyond their price.

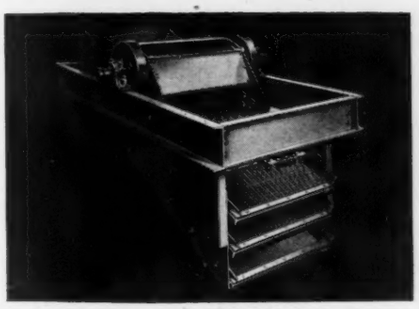
AMERICAN STEEL & WIRE COMPANY

208 SOUTH LA SALLE STREET • • CHICAGO

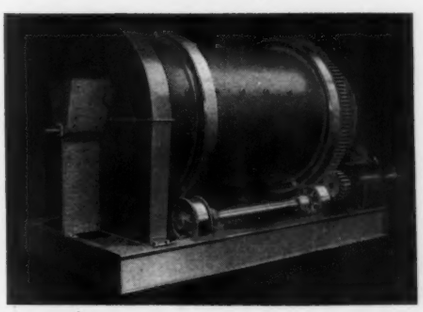
Offices in All Principal Cities

United States Steel Corporation Subsidiary

This Book SAVES TIME TROUBLE AND MONEY



THE NEW TELSMITH PULSATOR



THE NEW TELSMITH SUPER SCRUBBER

If you are in any way interested in the design, operation or management of a mine, quarry or gravel plant, or in the selection of its equipment, you will want this new book.

Authoritatively written, it describes and illustrates the most modern equipment now available. Every machine is designed and built to give you faster production and lower up-keep . . . to enable you to meet today's conditions and operate at a profit.

You'll want to know about Telsmith's latest engineering developments—the New Telsmith Pulsator and the New Telsmith Super Scrubber . . . latest improvements and new sizes of Telsmith crushers, plate feeders, gravity tanks, log washers, etc.

And this book contains the first table ever published by any manufacturer for figuring the capacities of vibrating screens of any size, and with any number of decks—of Telsmith or any other make of vibrator operating on the eccentric principle.

On every type of equipment . . . from crushers to bin gates . . . you'll find the book a dependable guide that will save you time, trouble and money. Sent without cost or obligation. Write for Bulletin E-11.

50 Church Street, New York City
211 W. Wacker Drive, Chicago, Ill.
130 S. 15th St., Philadelphia, Pa.
1109 Statler Bldg., Boston, Mass.
412 Westinghouse Bldg., Pittsburgh, Pa.
Milburn Machinery Co., Columbus, Ohio

SMITH ENGINEERING WORKS
508 E. Capitol Drive MILWAUKEE, WIS.

TELSMITH

FULL RANGE OF CRUSHING—SCREENING—WASHING PLANTS

ADAPTABLE TO ALL NEEDS

FIXED COMMERCIAL PLANTS—BRANCH PLANTS—TEMPORARY PLANTS IN SPECIAL LOCATIONS

AUSTIN-WESTERN engineers can quickly adapt to your particular situation one of the many standardized but thoroughly flexible plant designs built by this company.

When you buy a crushing, washing, or crushing and washing plant built completely by Austin-Western, you get the most practical equipment. For these reasons:

(1) The engineers of this company have long been leaders in the field. (2) Austin-Western engineers have very superior units with which to build crushing and washing plants—the three crushers below, for example, and Austin-Western conveyors, elevators, storage bins, power plants. (3) You are dealing with one company and buying from one source.

OVER 30 CRUSHING AND SCREENING PLANTS

The Austin-Western line includes many sizes and styles of crushing and screening plants, ranging from the smallest unit to the magnificent, all anti-friction bearing No. 100 Plant, with its primary and secondary crushers. Space does not permit listing these plants here; their capacities depend on the crushing units used. The two general types of portable and stationary plants are shown on the opposite page.

PORTABLE WASHING PLANT

For many years, the Austin-Western Washing Plant has solved a big problem for many users of washed aggregate by making possible the utilization of roadside material and thus saving transportation costs. This washing plant, used either alone or in conjunction with crushing and screening plants, has a capacity of 1,000 yards of finished product per day. It is low in first cost and exceedingly economical to operate. Actually, it is a revelation to those who have never expected that such capacity could be obtained from a 100% portable plant.

AUSTIN-WESTERN PRIMARY BREAKERS (Jaw-Type Crushers)

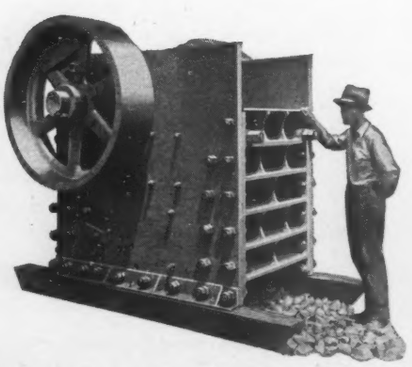
The Austin-Western jaw-type crushers are made in five sizes, all of which are similar to or identical with the No. 1838 Primary Breaker illustrated below.

No. 920 Austin-Western	9" x 20" opening
No. 1220 Austin-Western	12" x 20" opening
No. 1520 Austin-Western	15" x 20" opening
No. 440 Austin-Western	4" x 40" opening
No. 940 Austin-Western	9" x 40" opening
No. 1838 Austin-Western Primary Breaker	18" x 38" opening

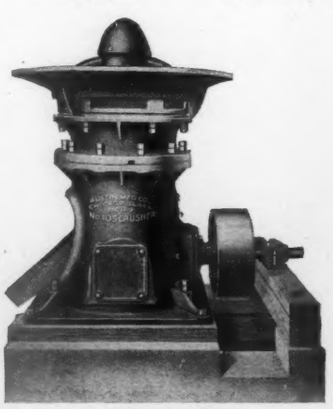
Large capacity, low operating costs and the ability to operate continuously under full load are features of these crushers. They are particularly high-speed—240 R. P. M. for No. 1838, 400 R. P. M. for the No. 440, etc.

Four highest-grade, SKF self-aligning roller bearings are used in each machine; with these bearings and an oversize shaft all trouble is eliminated. Also, to strengthen the shaft: the pitman and main bearings are closer together than in any other machine. Use of roller bearings results in a 60% power saving in starting and 10% saving in operating. Saves lubricant, too—uses 1 quart a day!

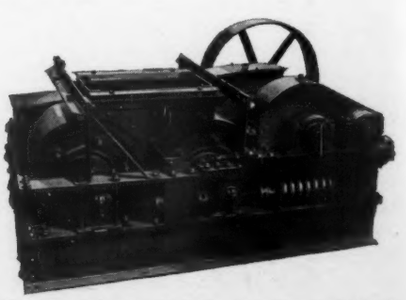
The use of steel plate for frames and toggles, of manganese steel for stationary dies, moving dies and cheek plates, and of chrome nickel steel for bolts are all features of fine frame construction.



The Austin-Western Primary Breaker No. 1838. This jaw-type crusher gives you large capacity at low cost per yard. With roller bearings, it operates at full capacity without bearing or shaft trouble.

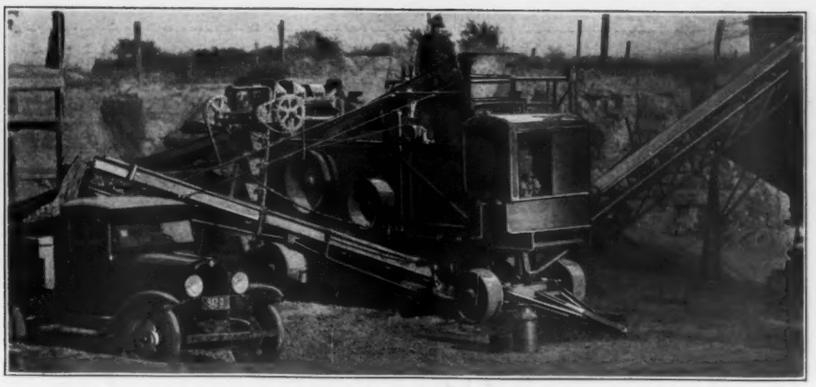


The Austin-Western "100-Type" Gyratory Crusher. Recommended where a cubical product is desired. Available in 7 sizes, ranging from 5 to 200 tons per hour capacity. A thoroughly modern, all-feature machine.



The Austin-Western Roll Crusher No. 3018. Available in one size, using 50 gasoline horsepower. Roller diameters (with shell) 30 inches, face 18 inches. Roll speed 60 R. P. M.

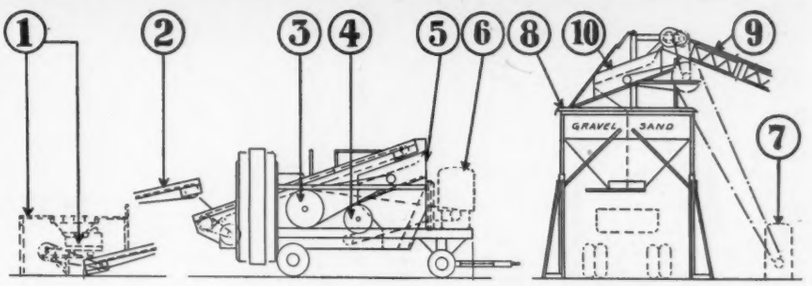
- EXPERTLY ENGINEERED
- LARGE CAPACITY RANGE
- PRACTICAL DESIGN THROUGH LONG EXPERIENCE



Typical Austin-Western Portable Crushing and Screening Plant. Plant is fed with an Austin-Western Primary Crusher.

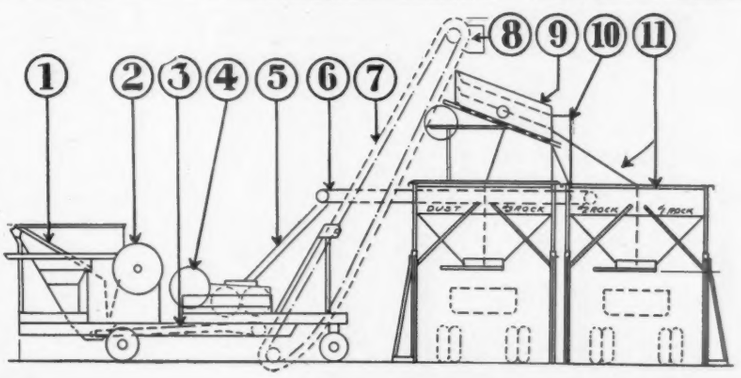
Portable Crushing Plant (No. 100)

(1) Mechanical feeder and loading trap (optional). (2) 30'-24" roller bearing conveyor from mechanical feeder to crusher. (3) 9 x 40 crusher. (4) Reduction crusher. (5) Gyrating screen, 2½ deck. (6) Motor, with belt, (optional). (7) Motor for driving conveyor to screen and screen itself (optional). (8) 15-yd. steel bin, two compartments. (9) 57'-24" roller bearing lattic conveyor—need not operate at right angles to crusher. (10) Single deck gyrating screen. Length of crusher unit, including conveyor, approximately 56 feet; width of plant, approximately 70 feet.



Quarry Crushing Plant (No. 61D2B)

(1) 3' x 7' grizzly. (2) 18 x 38 crusher. (3) Crusher conveyor. (4) Reduction crusher. (5) Spout from oversize conveyor back to crusher. (6) Oversize conveyor. (7) 30' folding elevator from crusher to screen. (8) Elevator hood. (9) Triple deck gyrating screen, lower deck divider. (10) Spout from screen to conveyor. (11) Two 15-yard, 2-compartment steel bins. Overall length of plant is approximately 60 feet; overall height approximately 28 feet.



THE AUSTIN-WESTERN "100-TYPE" GYRATORY CRUSHER

The superiority of the gyratory type of crusher for producing a cubical, uniform product with a minimum of power and expense has long been recognized. These advantages are obtainable to the fullest degree in Austin-Western "100-Type." It is available in 7 sizes, ranging from 5 to 200 tons per hour. The four smaller sizes are portable.

This is the only gyratory crusher that has a bearing on both sides of the driving pinion; the only crusher that receives the same size rock after the head has been adjusted up to the limit; and the only crusher that is thoroughly protected from dust and dirt by two solid, dustproof diaphragms above the oil chamber.

Also important are: a heavy main frame casting with large eccentric drive-end bearings cast integral; an exceptionally large main shaft; pumpless, splash feed lubrication; manganese steel heads and concaves. It is virtually impossible to place any limit on the life of an Austin-Western "100-Type" Crusher, for all wearing parts are easily replaceable.

THE AUSTIN-WESTERN ROLL CRUSHER No. 3018

The Austin-Western Roll Crusher supplements the Austin-Western Jaw and the Austin-Western Gyratory Crushers as an additional unit for fine reduction crushing. Capacities depend on fineness of product, ranging from 22 to 28 cu. yds. per hr., ½ inch or finer to 55 to 70 cu. yds. per hr., 1½ inch or finer.

Many unusual features are found in this machine. Outstanding from a structural standpoint is the location of SKF self-adjusting roller bearings. The shaft is stationary with the bearings *inside the rolls* close to the outer shaft supports, materially reducing shaft load. Other points are: 2-inch manganese steel shells; a provision for changing shells easily; roller chain drive for rolls; and a countershaft for direct motor drive. Heavy springs take the full load of crushing. Rolls are 30-inch.

The Austin-Western Road Machinery Co.

Home Office: Aurora, Ill.
Cable Address: AWCO, Aurora
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Austin-Western

ROAD ROLLERS, CRUSHING & SCREENING PLANTS, SCARIFIERS, SWEEPERS & SPRINKLERS, ROAD GRADERS, ELEVATING GRADERS, MOTOR GRADERS, DRAGS, SHOVELS, TRENCHERS, DISTRIBUTORS, WAGONS, SNOW PLOWS.

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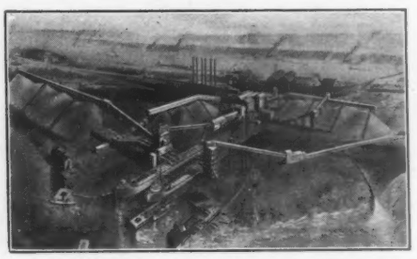
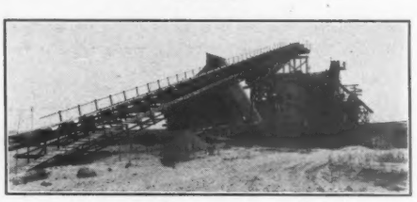
CONSTRUCTION IMPROVEMENTS REPLACEMENTS EXTENSIONS

Plants



Michigan Limestone and Chemical Company plant at Rogers City, Mich. More Than 50 Robins Belt Conveyors

New York Trap Rock Corporation Plant on Hudson River. 32 Robins Conveyors, 28 Gyrex Screens, 16 Vibrex Screens



Wabash Sand and Gravel Company, Terre Haute, Ind. About a Half Mile of Robins Belt Conveyors

Consolidated Crushed Stone, Sand and Gravel Company at Riverdale, N. J. Robins Feeder, Conveyors and Gyrex Screens

ROBINS MATERIAL HANDLING AND SCREENING EQUIPMENT is in wide use in every division of the Crushed Stone, Sand and Gravel, and Slag industries.

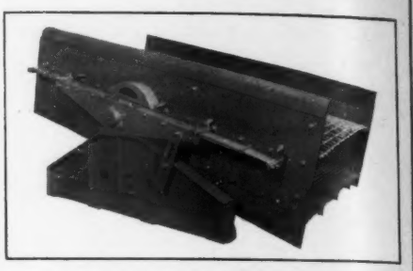
ROBINS VIBREX Screens for light service and GYREX Screens for the entire range of light, normal and heavy-duty service offer a complete selection that permits the proper choice of Screen for every purpose.

ROBINS CONVEYOR IDLERS have unique features of one-shot lubrication, check-valve seals and automatic bearing adjustment. Many styles cover a complete range of service and price.

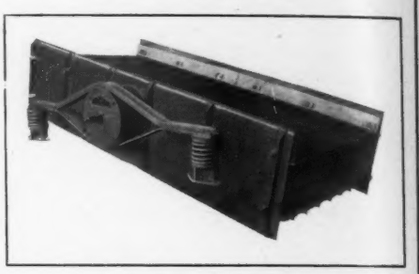
ROBINS Pulleys, Bin Gates, Screen Cloth, Standard and Robins-Oro Heavy-Duty Manganese Feeders, Gears, Pillow Blocks, Take-Ups, Trippers, Belt Training Idlers, Buckets, Portable Conveyors and Rubber Belts for conveyors and elevators are honestly designed and constructed to give long, continuous service.

If you are planning changes or if you want engineering advice and want the best equipment at economical prices—get in touch with us. Our experience covers 40 years of successful business which our clients have built up and maintained.

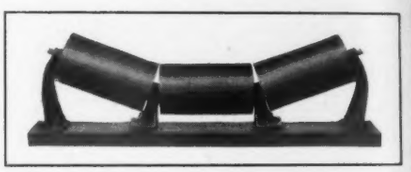
Equipment



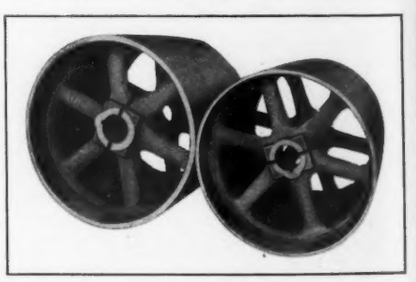
Standard Double-Deck Gyrex Screen With Cast Base



Style H Double-Deck Vibrex Screen



Robins Troughing Idler With Timken Roller Bearings



Robins Standard and Extra Heavy, One-Piece, Machine-Faced, Split-Hub Conveyor Pulleys

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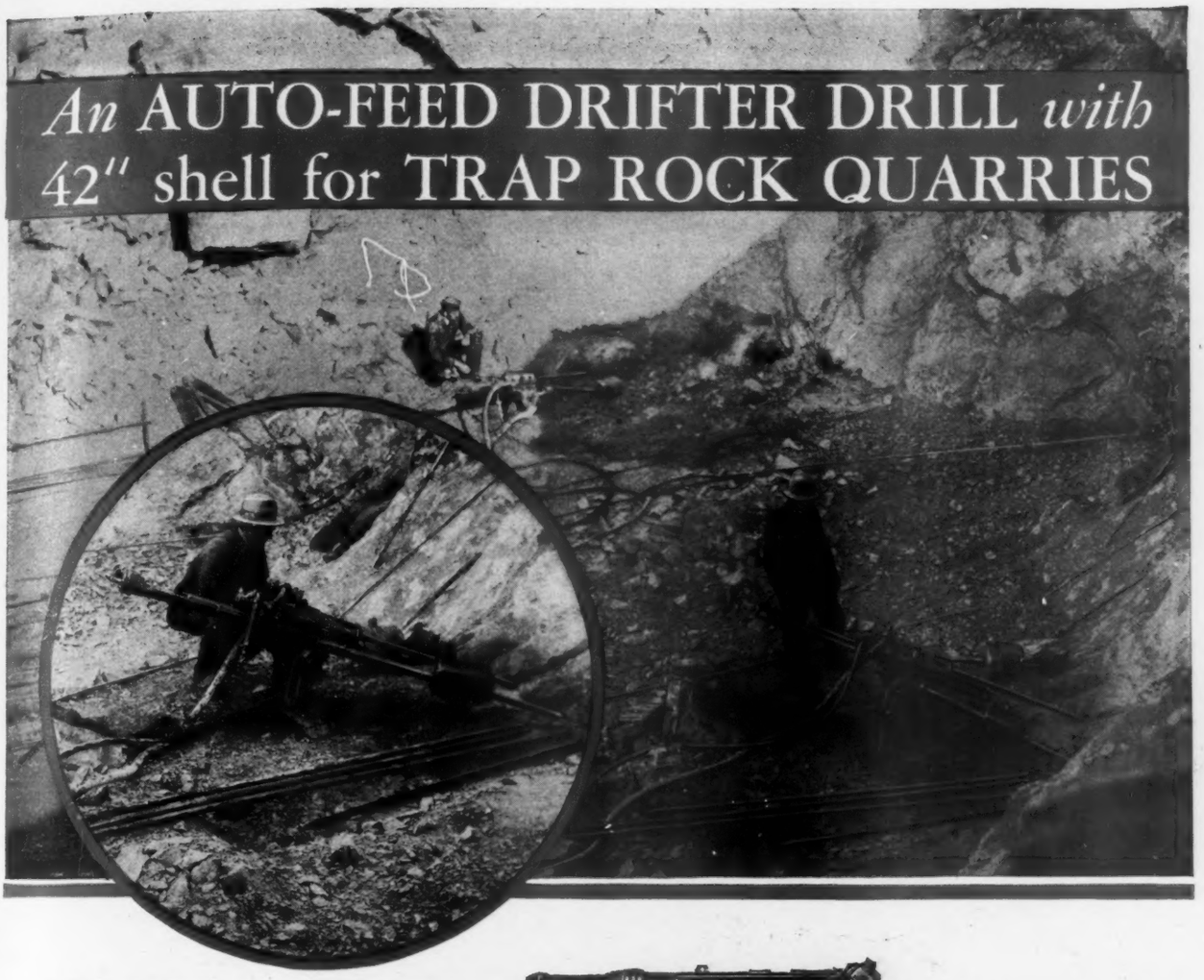
An AUTO-FEED DRIFTER DRILL *with* 42″ shell for TRAP ROCK QUARRIES



I-R Auto-Feed Drifter Drills at work in the Stony Brook Quarry of the Massachusetts Broken Stone Company, Stony Brook, Mass.

A RECENT development for trap rock quarries — the I-R Auto-Feed Drifter Drill with a feed shell of 42 inches.

I-R Auto-Feed Drifter Drills are proving their adaptability for quarry work and are being employed successfully for all sorts of drilling conditions, including horizontal and down hole drilling through seamy and shattered formations where the rock has previously been shot over.

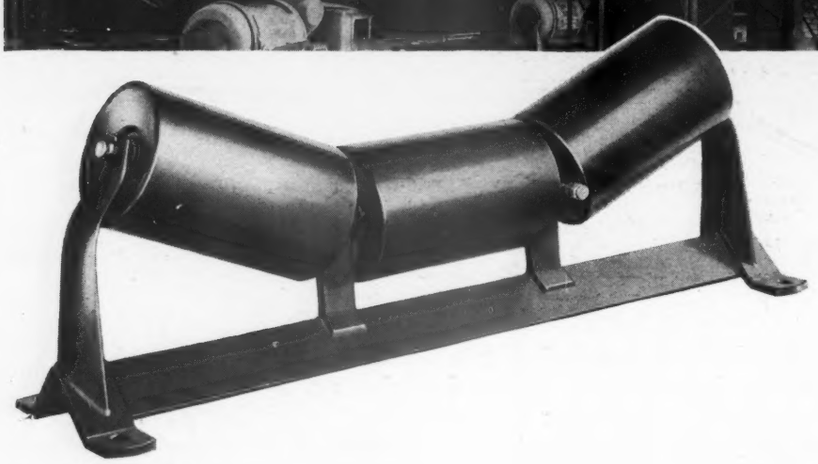
With the Auto-Feed Drills, feeding is completely automatic in all positions. This insures more footage per shift. The drill continues to work while the runner sorts his steel and gets ready for the next hole. Being relieved from hand cranking, the operator is as fresh at the end of the shift as at the beginning. Absolute safety for the runner in all drilling positions is another advantage.

These are just a few of the reasons why you will be interested in the I-R Auto-Feed Drill. There are others. May we tell you about them?

Ingersoll-Rand 96-5

11 BROADWAY. NEW YORK CITY

Barber-Greene Conveyors



Now you can have Barber-Greene quality where quality is most needed—in the conveyor idlers. Barber-Greene Idlers are now built in three general types—

PLAIN BEARING
BALL BEARING
ROLLER BEARING

All have the highest grade of materials and workmanship, and are backed by the years of Barber-Greene experience in idler design and practice.

Ask for a copy of our latest bulletin showing all B-G Idlers in detail—there is no obligation.

Barber-Greene Standardized Belt Conveyors are available in practically any length, and in a wide range of widths to meet all normal requirements; with roller bearing, ball bearing, or plain bearing carriers; standard or heavy duty sectional frame; head end or intermediate wrap drive; screw or gravity take-ups; and all necessary accessories.

The B-G Box Girder 30" deep Truss Frame is particularly adaptable to changing set-ups, being extremely rigid, and retaining its alignment when handled.

Barber-Greene customers benefit from the savings of quantity production, the quick delivery of standardized combinations, the interchangeability of parts, the extremely low cost of erection, and the high quality of each thoroughly engineered and proven unit.

Quotations gladly submitted on complete installations, or any of the Barber-Greene parts. No obligation.

Standardized Material Handling Machines

BARBER GREENE

495 W. Park Avenue
Aurora, Illinois

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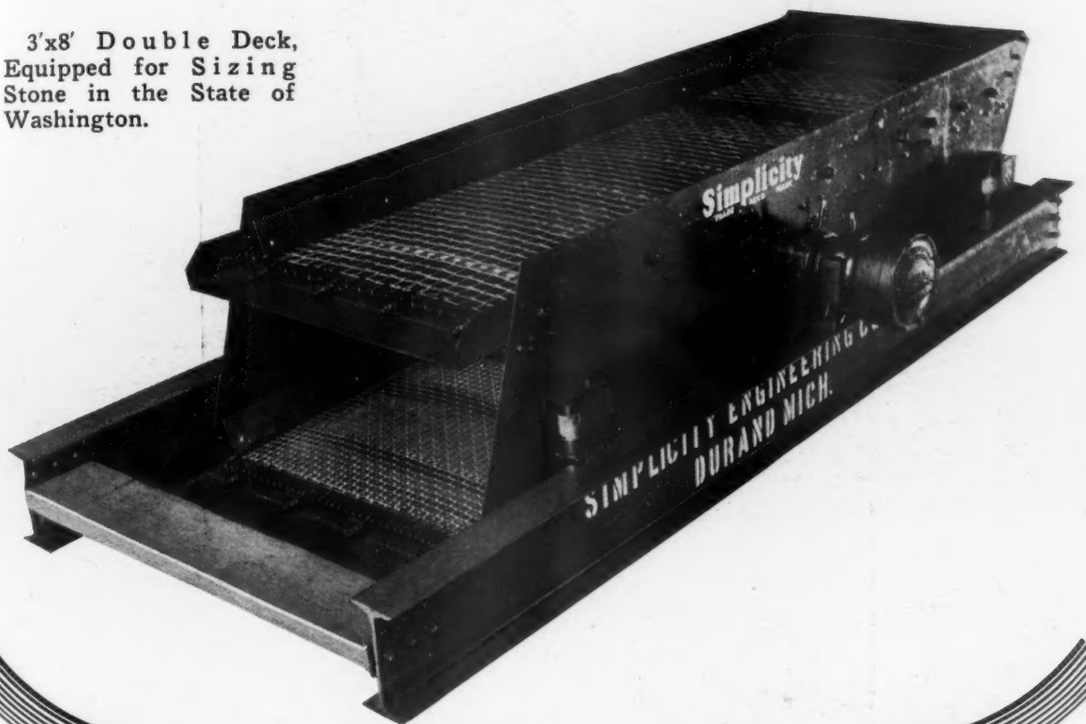
SIMPLICITY
GYRATING SCREENS

3'x8' Double Deck, Equipped for Sizing Stone in the State of Washington.



HERE IS THE SCREEN

Simplicity Gyrating Screens will send your production curves upward and make your cost curves take a dive; increased profits are the result.

It is the one gyrating screen that assures large capacity—its action is positive—its construction is extremely durable—its balance is perfect—there is no blinding—and the entire vibrating assembly is cushioned on rubber. These and many other features were developed by Simplicity to improve operating conditions.

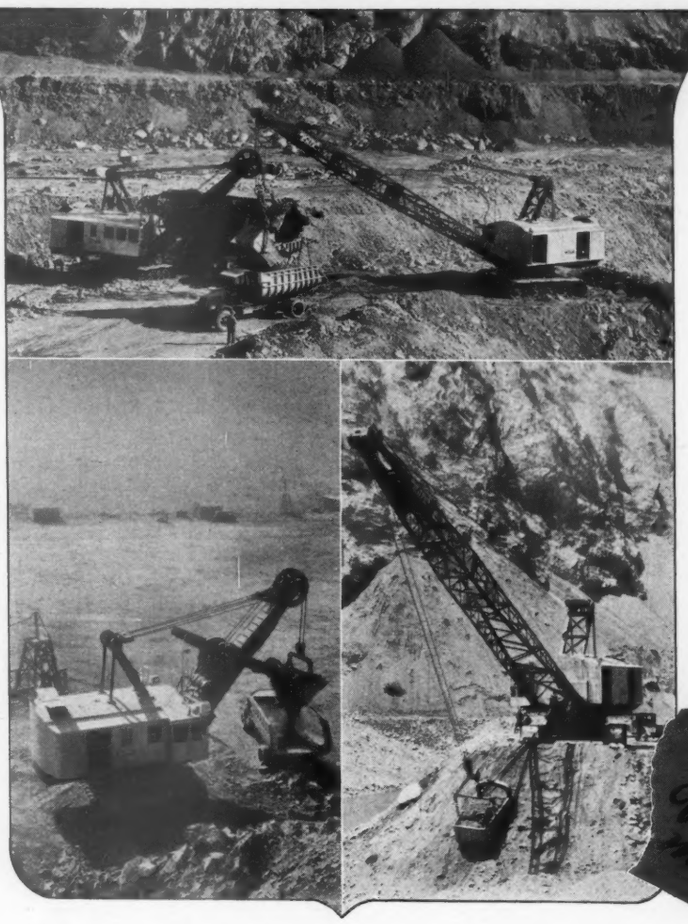
The fact that these "built-in features" actually do produce larger capacities and lower operating costs, has been definitely proven by many hundreds of installations during the past twelve years. Simplicity Gyrating Screens have been thoroughly tested and approved during this time by many satisfied users.

There is the proper size of Simplicity Gyrating Screen for every screening problem. Our recommended installations always guaranteed to produce. Write today for our latest bulletin describing this equipment.

SIMPLICITY ENGINEERING COMPANY
DURAND, MICHIGAN

For Canada: Waterous Limited, Brantford, Ontario

ANNOUNCING
... a new 120-B



Owners who knew the 120-B at first hand said it couldn't be done . . . that this famous 4-yard shovel had everything . . . couldn't be improved on. But there was a need in the quarry and mining field for lower costs. Bucyrus-Erie set to work to fill that need with more speed, larger output, greater flexibility . . . retaining all the simplicity and strength of the famous machine that put the railroad shovel out of business. Now this new 120-B is ready to go out on your job . . . completely modernized . . . with a faster cycle . . . even greater power at the dipper teeth . . . improved balance of weight and strength . . . ready convertibility that permits quick and convenient field change to dragline or shovel. Send for complete data on this new 1935 model 120-B.

871

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN
Excavating, drilling and material handling equipment

Jigger's Brother ....SELECTRO

can select any one of EIGHT different throws

Meet Jigger's Brother

at the CONVENTIONS of the

National Crushed Stone Association
National Sand and Gravel Association
National Slag Association

PALMER HOUSE, CHICAGO, ILL.

JANUARY 27-28-29-30-31 and FEBRUARY 1, 1935

PRODUCTIVE EQUIPMENT CORPORATION

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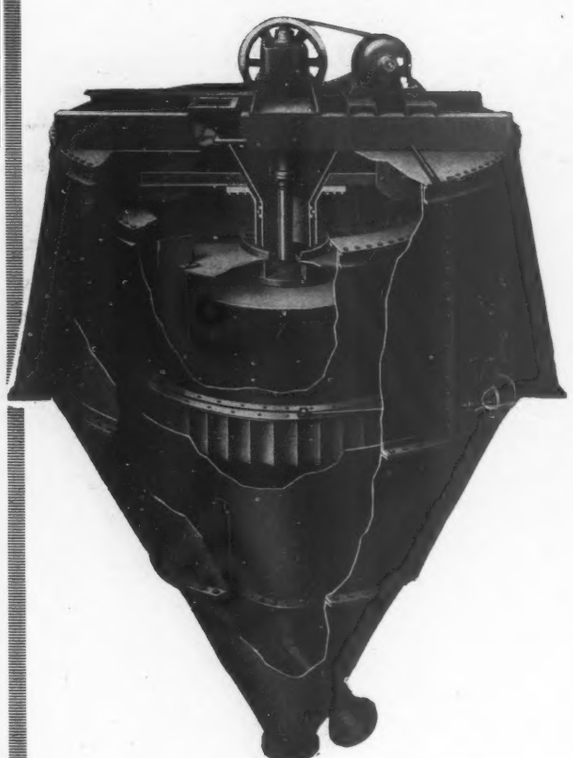
cement manufacturers! are you interested in high early strength?



This is the "Whirlwind" Separator

THE STURTEVANT

that will give it to you

The unmistakable trend is toward more rigid specifications requiring more intensive chemical and operating control.

Higher finenesses in terms of specific surface areas, together with low temperatures, make the installation of STURTEVANT WHIRLWIND CENTRIFUGAL AIR SEPARATORS a decided economy and almost a necessity.

Without Separators high early strengths may be made but at almost prohibitive costs and, likely as not, disappointing results.

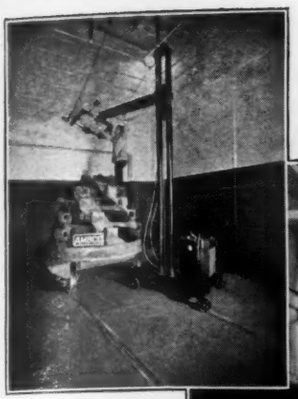
The STURTEVANT organization, backed by many years of training and experience in pulverizing and separation, offer you this experience in solving your problem.

our cement plant record

One hundred twenty-eight "Whirlwinds" . . . Forty-eight Cement Plants
Average installation three to four . . . . . One company has forty-six

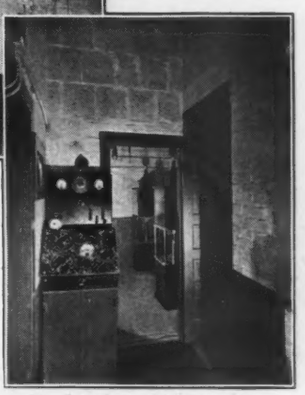
STURTEVANT MILL CO. HARRISON SQUARE **BOSTON, MASS.**

X-RAYED



Exposure room, showing X-ray tube stand — indicating flexibility of apparatus.

Exterior view — AMSCO X-ray Laboratory.



Control stand, looking toward machine room.

To Insure Sounder Castings!

The last word has not been said in more closely adapting metal compositions to definite service conditions. Neither is it impossible to improve standards of design, foundry procedure, and heat-treatments of alloy steel castings so that they will more efficiently and economically serve their intended purposes.

But so much has been accomplished in these fields that the AMSCO Research Department has turned its attention to another and more pressing problem — that of giving the user of AMSCO Manganese Steel or AMSCO Alloys, castings of such reliable soundness as will enable the alloy steel to develop its potential efficiency and economy to the greatest extent.

With the visual evidence given the engineer and foundryman by the X-ray of internal defects otherwise not identifiable, problems of design and foundry method are sooner or later solved. This scientific tool enables the establishment of standards that result in commercially sound castings being consistently produced, fully adequate to the intended service requirements.

This expensive equipment will pay for itself in greater economy both for AMSCO and our customers. To avail *yourself* of these benefits, insist that your Manganese Steel or Nickel-Chromium Alloy Castings shall be AMSCO made.

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Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities.

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CUT PRODUCTION COSTS

WITH THIS MODERN CRUSHER

Front View Showing Breaker Plate Adjustment.

WHETHER you will be in the market to buy a new crusher is not the question. If you are interested in crushing stone and other refractory materials, you should know about AMERICAN CRUSHERS. These Crushers bring a lower production cost.

Investigate NOW and get the facts so you will be informed on NEW developments.

SPECIAL FEATURES

Heavy Cast Construction — Compact Design.
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Cast Steel Discs—Two Inches Thick.
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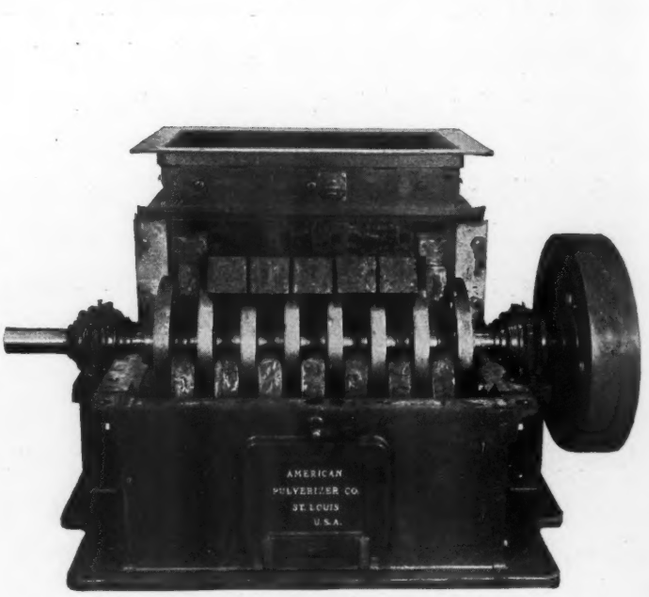
Low First Cost—Easy to Install.
All Parts Easily Accessible.



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Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXVIII Chicago, January 15, 1935 Number 2

Rock Products Producers Have Made Progress Under Their NRA Codes

Government Competition in the Aggregate and Agricultural Limestone Industries Has Cost Legitimate Producers Much Business and Has Resulted in Loss of Wages to Employes, Loss of Profits, and Much Unemployment in These Industries

IN ACCORDANCE with an annual custom of long standing, the editor has questionnaired his readers in regard to a variety of intimate problems, the better to guide his editorial efforts throughout the present year, and to compile for this annual review issue a true picture of the industry. The answers to the questions asked were given in confidence as to their source, and they contain a wealth of helpful and suggestive editorial material, which the editor here acknowledges with deep-felt gratitude and appreciation.

Employment—Why Not More?

Quite as was expected, the practically unanimous answer to the question why more men had not been employed in these industries was "lack of business," or "lack of orders." A few stated that as many were employed as at any time in the history of their companies, but on much shorter schedules, so that even with increased rates of pay, workers do not receive as much annual income as they were accustomed to in better days.

The next question was: "Would you have employed more men if you had had more business?" Of course, the snap answer to this is "Yes." However, the question had a deeper significance that some few caught. For obviously, it would seem, if the plants are operating at only a small percentage of capacity, their outputs could be very considerably increased without additional man power. This was pointed out by a considerable number of producers in all the industries. Also, the stress of the times has taught greater efficiency to both employers and employes.

Courtesy, *Chicago Journal of Commerce*

Production and Employment

Our questionnaire was not carefully enough worded, or was not answered with enough forethought, to develop a trustworthy estimate of the increased number that would be employed with a 25% or a 50% increase in demand, but it is evident, of course, that employment is not in direct ratio to production, although total wages paid generally are. Increases in demand for rock products up to a 50% increase over that in 1934 probably would result in not more than 20 or 25% increase in the number employed in these industries, but the workmen already employed would get a much better break in most instances.

Possibilities of Side Lines to Help Employes

The questionnaires develop

MAN FALLS IN CRUSHER!
KILLED ON PAY DAY!
SIX MEN KILLED TWO CRITICALLY INJURED—HANDLING BLASTING POWDER!
KILLED! 24 YEARS OLD — WIDOW AND TWO CHILDREN GRIEVE!
CAUGHT IN SAND PIT CAVE-IN. ONLY ONE ARM BROKEN—LUCKY!
PROFITS OF GOVERNMENT COMPETITION IN HAZARDOUS INDUSTRIES WITH INEXPERT SUPERVISION AND INEXPERIENCED MEN!

that in some cases workmen do get other part-time jobs when plants are shut down or running on very short shifts, and if this practice continues, and grows with a return of general business, as it may in some localities, it will result indirectly in spreading such part-time employment over a much larger group. This can not be a very satisfactory solution, from the point of view of the employer, but it has interesting possibilities in industries of a pronounced seasonal character such as these. Producers in some instances may find it advisable to go into other lines of business where seasonal employment dovetails with seasonal unemployment in the rock products industries, in order that enough employes to man their plants at any time may earn adequate annual wages, as well as for the reason of making fuller use of staff organizations and investments. Concrete products, for example, might be manufactured in off seasons and stored, to be sold later by the same organization that sells cement or aggregates.

Present Working Hours Feasible?

Opinion in the cement industry seems to be about evenly divided as to the feasibility of the 6-hour day and 36-hour week. Quite a few manufacturers think a 40- or 42-hour week would be better, in view of the necessity for continuous operation, 7 days a week. Others think the 36-hour week unfair to employes because of the seasonal character of the work. One prominent manufacturer who is influenced by humanitarian as well as utilitarian considerations says the 36-hour week is feasible but difficult to work out. Others seem satisfied without further comment.

Sand and gravel producers, 2 to 1, consider present code hours feasible. Practically all the objection is based on the seasonal nature of operation, which objectors believe should permit longer shifts when operation is possible. A number about equal to those who oppose present working time limits qualify their approval with such comments as: "So long as demand is no greater"; "if working shifts could be averaged over a longer period"; "all right for common labor, but skilled labor should be allowed a longer day"; "until boom times compel a lot of over-time pay"; "all right for around cities, but not in the country"; "difficult under normal conditions." One producer reports operating 24 hours a day and finding the 40-hour week no handicap, but the short season did work a hardship on his men.

In the crushed stone industry opinion as to the feasibility of the 40-hour week is about evenly divided. As in the sand and gravel industry, the majority of those opposed want the seasonal character of the operations taken into account, especially through more liberal terms for averaging over a three- or six-month period. Those who qualify their approval make such comments as: "A nuisance when production varies"; "provided time-and-a-half is paid for overtime"; "only under present conditions"; "experienced men should be allowed to work longer periods." Undoubtedly labor that it is safe to work in quarries is harder to get than sand and gravel plant workers, which may account for the greater objection of crushed stone producers to the same code hours; also many quarries and crushing plants can not operate satisfactorily in rainy weather, which need not interfere with gravel operations.

Lime manufacturers, with few exceptions, are satisfied with the code requirements as to hours of labor. The comment is made that in such a continuous operation manipulation is difficult but the code requirements are feasible and workable. Gypsum manufacturers without exception and without comment, express satisfaction with the code labor requirements.

In a group of producers including feldspar, talc, sand-lime brick, garnets, silica, industrial sands, agricultural limestone, pulverized limestone, dolomite, etc., there appear to be no objections to the limits on hours per day in the codes, except on the part of industrial sand and talc producers; in each of these industries opinion is about evenly divided.

Government Competition a Serious Factor

So far there has been no direct government competition except in the crushed stone, sand and gravel and agricultural limestone industries. Nearly all localities except New England have had some of this kind of competition, but no more than half of the number reporting found this competition serious. Estimates of the amount of business that would have come to these producers if the governments (mostly local) had bought instead of produced aggregate requirements vary from 10 to 80% of the year's output. Probably the average is between 20 and 25%. Additional employment in the legitimate industry would probably have been increased 10 to 20%, had all these governmental requirements been purchased. Of course, that would have been a very small percentage of the number of men actually employed getting out aggregates for FERA and local PWA projects, but the materials would have been produced efficiently and economically and the national and local governments would have had more to show for the money spent. Also, the so-called heavy industries and the railways would have been helped.

Have Government Buy at a Fair Price

If all government agencies could be convinced that a policy to produce nothing that could be obtained from private industry at a fair price, would be a long step toward recovery, these rock products industries would forge ahead in a way to make glad the hearts of both their own employes and the machinery manufacturers in the heavy industries, whose customers they are. For not only the actual production diverted to such agencies, but the uncertainties and risks of further encroachments into their industries, are keeping rock products producers from lending much real assistance to the recovery program.

There is no reason that we can see why every employer and every employe in the United States can not be gotten behind a movement "to have government buy all requirements at fair prices." More signatures could be obtained for such a resolution or petition than Dr. Townsend claims to have for his absurd scheme to pension every one over 60 to the tune of $200 per month, because the total number of employers and employes, and their wives, must represent a majority of the votes in this country.

There are plenty of arguments in favor of such a campaign besides its effect on recovery. There is the inequity of this kind of competition, where inefficiency and extravagance are paid for by taxes on industry and on the industrious. In the rock products industry there is the disregard of ordinary protection against the hazards to life and limb, a lack of responsibility for the safety of workmen which every private employer is obliged to assume.

About 10% of Cost Is for Paying Taxes

Aggregate producers estimate that local, state and federal taxes now constitute about 10% of the cost of their products. Estimates vary all the way from 1½ to 32%, depending, of course, largely on the tonnage over which the tax cost is spread and upon the locality. A considerable number do not know what their tax cost is. They ought to know, for it is a cost their governmental competitors do not have. Add to this, employer's liability insurance, contributions to civic causes, etc., which might be termed "social costs" of doing business, and one would find probably his costs are of necessity 20 to 25% more than his governmental competitor. However, this would not be a serious handicap if his governmental competitor kept costs and was guided by them.

An Arkansas producer submits the following list of taxes he is assessed for (we suggest that those who do not know what their tax costs are check this over and see if their contributions to the public welfare are not more considerable than they realize):

Who Pays the Fiddler?

(Some Tax Burdens of a Small Business)

1. City corporation tax.
2. City library tax.
3. City garbage tax.
4. City wharf terminal bond and interest tax.
5. City refunding bond and interest tax.
6. City levee bond and interest tax.
7. City levee and drainage tax.
8. City public benefit tax.
9. City park tax.
10. City bond tax.
11. City automobile license.
12. County general tax.
13. County registered bond interest tax.
14. County road bond tax.
15. County highway tax.
16. District road tax.
17. District road bond tax.
18. Common school tax.
19. High school tax.
20. Drainage district maintenance tax.
21. Drainage levee tax.
22. Local bank check tax.
23. State general tax.
24. State automobile license fee.
25. State gasoline tax.
26. State sales tax—merchandise sold.
27. State sales tax—merchandise purchased.
28. State franchise tax.
29. Federal income tax.
30. Federal excess profit tax.
31. Federal tax on oil.
32. Federal tax on gasoline.
33. Federal tax on telephone calls.
34. Federal tax on telegrams.
35. Federal tax on checks (expired January 1, 1935).
36. Federal tax for code administration.
37. Federal capital stock tax.
38. Federal tax on conveyances.
39. Federal tax on electricity.
40. Federal tax on safety deposit boxes.
41. Federal processing tax.
42. Federal excess postage rates.

This does not include numerous indirect taxes.

Federal and state inheritance taxes will take a big slice of any property which the deceased has labored to accumulate for the care and education of his family.

Taxes collected from the cement industry constitute about 5% of the cost of its product. The lime industry gets off with 2 or 3%. The gypsum industry pays about 10%.

A Considerable Number of Producers Would Return to Price-Cutting

Still Want More Freedom to Do as They Please; a Few Believe Competitors Take Unfair Advantage of Their Positions on Code Authorities

CODE METHODS of doing business in the open have won many converts during the past year, comparison with our review a year ago shows, but there are still quite a few who would abandon them for a return to rugged individualism, and a "devil take the hindmost" policy. Generally speaking, in the case of the aggregate industries, the old established producers (not necessarily the large ones only) seem to have profited at the expense of those who got most of the business away from them in 1933 by cut-throat methods. Of course, like all generalities, there are numerous exceptions. It is a common reaction, however, where a buyer can not beat down the price of a commodity to buy of those who have an established reputation for service and quality. This apparently has happened in the aggregate industries, and the additional volume thus gained by the old established producers has in many cases reduced their costs to a point where those who have depended on cut-prices to get business no longer have the advantages they formerly did.

After more than a year's experience with their code, members of the crushed stone sand and gravel and slag industries are divided almost equally into three divisions: (1) one-third are unqualifiedly against the code; (2) one-third are unqualifiedly for it; (3) one-third are for it with numerous qualifications. The reasons why the code is unpopular with so large a percentage are numerous and not always very logical or justifiable. Here are some taken at random: "merely gives price-cutting a better chance"; "does not control amount of freight to be absorbed"; "assessments too much"; "no benefit to small producers"; "seems designed to eliminate the little fellow"; "because it is not enforced"; "gives advantage to big producers";

"worthless when you can't trust the word of a competitor"; "increases costs."

Those who approve the code, with qualifications, comment somewhat like this: "Not entirely satisfied but it has benefited the industry"; "room for improvement"; "yes, because it demonstrates to every producer the advisability of coöperation; no, because it takes away business enthusiasm by too many restrictions"; "if it can and will be enforced"; "except as to assessments"; "does some good, and will, but it costs too much"; "administration far from perfect"; "open price policy does not function to advantage of small producer"; "no protection for district to prevent dumping from another district"; "approve only open-price part of code"; "big producers have temporary advantage"; "could be better." Quite a few who approve the code complain that it is not enforced.

More Unanimity Among Cement, Lime and Gypsum Producers

Cement manufacturers, 2 to 1, are more or less satisfied with their code, although only a few without qualifications. Most of the qualifications concern the hours of labor and lack of enforcement of other provisions. Lime manufacturers are much more unanimously in favor of their code, while gypsum manufacturers are actually unanimous.

In the group including feldspar, concrete products, sand-lime brick, tripoli, silica sands, whiting, agricultural limestone, talc, etc., the codes, where there are any, do not appear to be very popular, with the exceptions of feldspar and sand-lime brick. The silica or industrial sand producers, without exception, think the costs are out of proportion to benefits received. Very little appears to have been accomplished for producers of pulverized limestone, who do not seem to have received adequate attention in either the lime or crushed stone codes.

What Parts of Codes Are Really Essential to Success?

The codes of all the industries are undoubtedly due for extensive revision this year. Right now attention is focused on those provisions dealing with price. But some few codes have been changed to permit members of an industry to agree to enforcement through voluntary contracts, with penalties or liquidated damages to be paid by those who violate these contracts. Such contracts or agreements, if they got by the anti-trust laws, would be enforceable in any civil court without resort to criminal prosecution, or help from the U. S. Department of Justice, or NRA.

It has been our impression that opinion in the rock products industry considered the code provisions against selling below cost, for uniform terms of sale and discount, for open price reporting, and in the codes which have it, the provision for restricting new productive facilities, were the very essence of the codes, and that without these provisions the codes would be practically useless.

However, our questionnaires show that only about 40% of producers in the crushed stone, sand and gravel and slag industries think all these are necessary to success of the code. About 25% think the code is worthless anyhow. The others differ on what are really essential; a few are non-committal, or have remedies of their own, of which allocation of available business is one. Of the 25% who do not think all these provisions are necessary, a few would be satisfied with labor provisions only. About an equal number would dispense with limitation on new productive facilities. As to the necessity of provisions for uniform terms of sale and discount and open price selling, about as many believe these essential as believe them not essential. The two together constitute a little better than 10% of those reporting. Summarizing, somewhat over 50% of the industry thinks that the code without these two provisions—open price selling and uniform terms of sale and discount—would be worthless; most of this 50% includes prohibition of sales below cost and limitation of new productive facilities.

Our own opinion is that open price selling, if honestly conducted, and uniform terms of sale and discount, together with some of the fair practice provisions, are the only parts of the code that are really essential to the welfare of producers, or of the industry. The labor provisions, it is assumed, are in the codes to stay. In most sections of the country where anywhere near a whole-hearted attempt has been made to live up to them, it is clear that these provisions have helped the industry get back on its feet. Most of the complaints come from those who have had little experience with them, or where the experience has not been satisfactory. But, after all, a year is a short time in which to change practices of many years' standing. The fault is not with these code provisions, but with the observance or administration of them in some districts.

In the cement industry most manufacturers believe all the provisions in the present code are essential, with the possible exception of limitation on new productive facilities, which has not functioned. The lime industry code has no provision for limiting new productive facilities; and manufacturers are practically unanimous that the other provisions are successful. The same applies to gypsum manufacturers.

It would seem from our questionnaires that producers in the rock products industry would part with code provisions on limitation on new productive facilities, where they have them, without much weeping. This is interesting because when the codes were drawn this was considered a prime requisite. Possibly they have merely become reconciled to the almost certain elimination of these provisions, but many comment that they are impracticable and could never be enforced.

Could Mutual Agreements Take the Place of NRA Enforcement?

Although it looks as if the codes were headed for revision that would make their observance voluntary by mutual agreement, to post bonds to pay liquidated damages by those who failed to keep the agreements, the members of the crushed stone, sand and gravel and slag industries are opposed to such a development more unanimously than on any other subject related to the code. Some 50% are emphatic that this would not serve the purpose. About 35% favor this method of solving the code enforcement problem. About 15% are either non-committal or qualify their answers with "perhaps"; "might help"; "not any

better than present method"; "possibly"; "probably"; "worth trying"; "doubtful."

Cement manufacturers are also about evenly divided on whether this method of enforcement would work or not. A considerable majority of lime manufacturers favor it, and the same is true of gypsum manufacturers. Producers of other rock products generally do not think the method practical.

The objection, of course, is that the problem of the non-signer would be difficult to solve, if the signing was voluntary. In the construction industry, with the government doing most of buying, this would not be so difficult, assuming that the non-signer, as at present, would be excluded from participation. Some interesting and enlightening suggestions are made for dealing with non-signers; perhaps this one, from a feldspar producer, takes the cake: "Partly by association of signers concentrating on the market of the non-signer with cut prices"—which illustrates how well our NRA vaccination against business immorality has taken effect on some producers. Nevertheless, if legal, that method probably would be effective in that it would teach the offender speedily that it does not pay to go counter to the natural flow of industry. A few, who have really "got religion," believe persuasion and pressure of public opinion would bring in the non-signers.

Production and Prices Better Than in 1933

In the cement and mineral aggregates industries, because of the large volume of highway and public works construction, production and shipments were probably 25 to 30% above 1933. There was probably about a 10% greater lime tonnage and perhaps a little increase in gypsum. There was a very considerable increase in talc production and about 10% increase in the production of industrial sands. Agricultural limestone sales were probably 25% or more better than in 1933.

Prices, generally, in the rock products industries were slightly better than in 1933, but there was no general surge toward appreciably higher prices. In the sand and gravel industry there are a few instances where prices increased as much as 100%—but without knowing all the circumstances one does not know whether the increases were justified or not. There were also instances where prices had decreased as much as 50%. These were in two or three of the mid-west states where the code has failed to function satisfactorily, chiefly because the producers have been more starved for business than they were in 1933—for the state governments failed to let highway contracts of any considerable amount, and this because they used their highway funds for some other purpose.

In many sections of the country cement price quotations did not change from those in effect in 1933, but in some sections where there was a large amount of public works, and cement for them was sold direct, the better prices prolonged negotiations obtained are reflected in a better general average return for the industry as a whole, amounting perhaps to about 10% above that of 1933. Prices in the lime and gypsum industries seem to have remained about where they were in 1933.

Crushed stone producers report price increases averaging perhaps about the same as sand and gravel—10%. It is pointed out that price quotations in numerous instances did not vary much from those of 1933, but about a 10% better average return was made possible through the elimination of "soft spots"—that is, presumably, secret price-cutting and special concessions to meet those made by competitors.

Good Done by Codes Not Generally Appreciated

It would appear from an analysis of the foregoing paragraphs that the codes of the rock products industries have generally increased the price stability of these industries. Of course, there was an appreciable pick-up in production at the same time, so that it is difficult to determine what effect this had. But with still only about 30% of the capacity of the industries utilized, it is not likely that price stability would have resulted from this pick-up alone. It would seem that the average producer is reluctant to admit the good the codes have done, because his attention is too largely riveted on their defects.

What Help Can Rock Products Industry Be To Other Capital Goods Industries?

PRODUCERS AND MANUFACTURERS in the rock products industries who have maintained their plants 100% are the exception, and those who have recently modernized them are rare.

In the cement industry about half those reporting say they have spent 100% of normal requirements for maintenance and renewals—but with operations at 30% of capacity "normal" requirements are not what they were, or would be, at 75% capacity. The same is true of all the rock products industries, for the life of equipment is usually measured in tonnage rather than years.

The crushed stone, sand and gravel and slag industries, in 1934 probably did not spend on the average in excess of 10% of a normal year's requirements for renewals and replacements.

The reason is the same in all the rock products industries. There was practically no new financing, and requirements for maintenance came out of earnings, which, while appreciably more than in 1933, were not sufficient to finance many changes producers would have liked to have made.

The outlook for 1935 is much better, but there is much uncertainty. The almost universal answer is: "We would buy much needed new equipment, if ——" As was pointed out in the comment on government

competition, this is an important factor which deters needed purchases by legitimate producers. Those manufacturers of machinery and equipment who have been instrumental in getting government into aggregate production in many localities are taking this business at the expense of an equivalent amount of business from legitimate producers.

Improvements in Processing the Key

With no call for increased productive facilities except in the case of crushed stone or sand and gravel in isolated localities, and with but 30% of the capacity of most of the plants in use, it is obvious that only marked changes or improvements in processing, or economy in handling, have tempted producers to make considerable investments in new machinery and equipment. Thus in the cement industry various devices for cooling, or air-quenching, or tempering clinker have been installed not merely for improved heat economy but because a better clinker resulting in a better cement is easier to sell than just "standard." Similarly improvements in grinding equipment are sufficiently cost-saving (in power and maintenance) to justify plant changes.

In the aggregate industries changing highway specifications to permit use of crushed gravel in asphalt type surfaces has given rise to a considerable demand for fine crushers—usually a roll type; construction work on the Mississippi river under the U. S. Army Engineers has called for concrete sand requiring very careful gradation. This has led to the installation of new sand classification devices. Demand for smaller sizes, and more accurate sizing, of aggregates has maintained a market for vibrating screens.

Big Demand for Machinery and Equipment in Prospect

While it would be impossible for any one to tell from the present state of mind of the industry just when the pent-up demand for new equipment and machinery will break, there is no doubt of its existence. The following are typical comments of men who know:

Cement: "As soon as we can see ahead, a probability of operating 50% or better, with present prices maintained, I think that economies in operation, effected during these lean years, will permit further increase in wages, and replacement of much equipment, which has become somewhat inefficient, with new and better units." "We believe that the rock products industries are very large potential purchasers of machinery, etc., when there is some prospect for operation at a reasonably high percentage of capacity. Capital expenditures can not be justified from the point of view of return on investment with production schedules down around 20 to 40% of capacity."

Lime: "Increasing prices have not kept pace with increased costs under NRA. Equipment for repairs, replacements, and for the improvement of our products would be installed if credit facilities were better. Low working capital and infinitesimal profits keep the improvements down. Longer term credits are necessary if the improvements are to be made. Such credits are not available to us and possibly not to many others."

Crushed Stone and Lime: "Unless exceptional (that is at present unforeseen) circumstances prevail, no commercial producer would undertake any program of expansion or of increasing production facilities. Expenditures for equipment will, therefore, be largely confined to units and devices giving promise of lower production costs, or for the purpose of further refinement of the industry's products. Current replacements, demand for which has been accumulated during recent years, should result in moderate buying with a considerable portion of such expenditure being for new and improved devices rather than merely repairing present equipment."

Crushed Stone: "In the present situation of selling at little or no profit, it becomes essential to have the most efficient type of machinery and equipment on the job. Possibly in 1935 some new and improved equipment may be installed for the purpose of increasing efficiency and economy of production. Any machinery, other than replacements, will be installed for this reason alone and not for increased production, unless demand takes a sudden jump."

Crushed Stone: "If rail rates are kept lower than motor-truck rates—and they are now 4c per ton-mile in our section—we believe established producers as a whole will maintain and improve their plants with a view of keeping costs low, but I do not know how to estimate what it may amount to. The truckers hauling at 4c per ton-mile are not making any money, nor in our opinion can they make replacements and still carry proper maintenance."

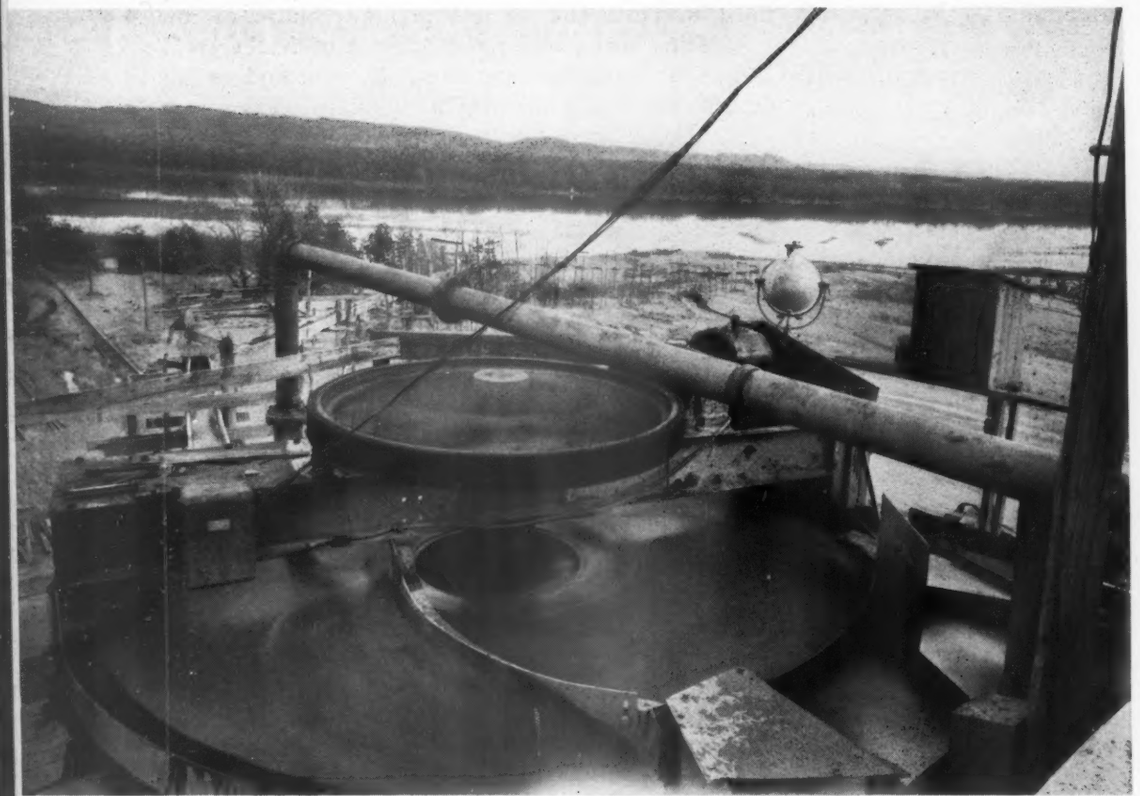
Sand and Gravel: "Any increase in business over 1933 and 1934 will require repairs and replacements of equipment in a greater proportion for the reason that plants and equipment generally have not been kept up to standard, and would have to be put in better condition to care properly for any increased output."

Sand and Gravel and Crushed Stone: "Since 1929 we have reduced the number of our operating sand plants from four to two, and operating crushed plants from six to one. No particular attempt has been made to maintain shut-down plants in operating condition, when the equipment from them can be used for maintaining operating plants. Should demand begin to increase, we would have a great deal of equipment to buy before we could meet the demand we had in 1929."

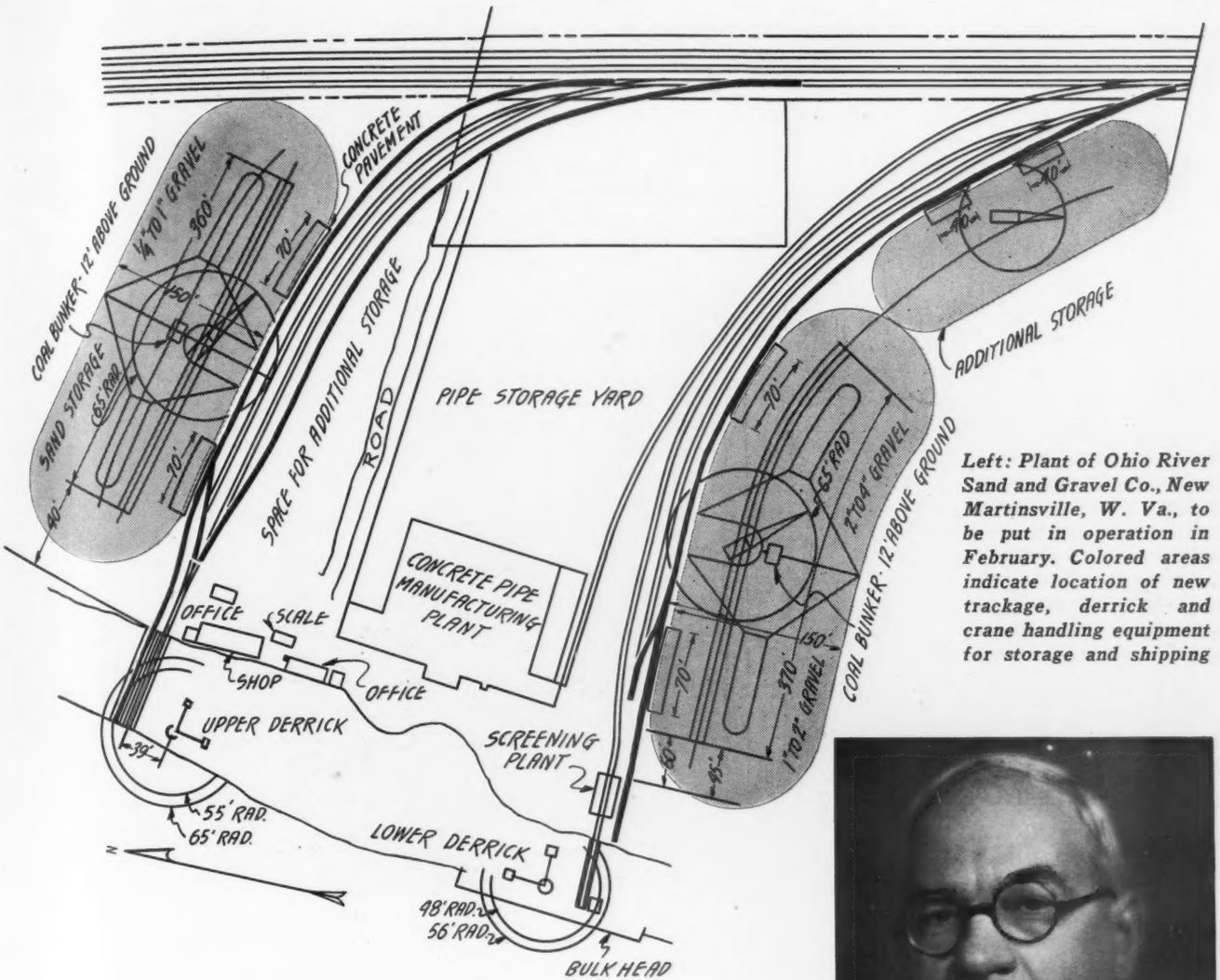
Conclusions: The foregoing probably do not look very encouraging to machinery and equipment manufacturers, but they are only a few representative general views. Numerous producers tell specifically what they intend to do in 1935 and from these there is assurance of considerable business. With any real pick-up in demand, such as there would be if the various government units were to buy their requirements instead of attempting to produce them with make-shift equipment, there will be let loose a pent-up demand which bids fair to swamp manufacturers of machinery and equipment.

Trends in Sand and Gravel Production

How Sand and Gravel Producers Are Fulfilling New Specifications and Large Volume Contracts



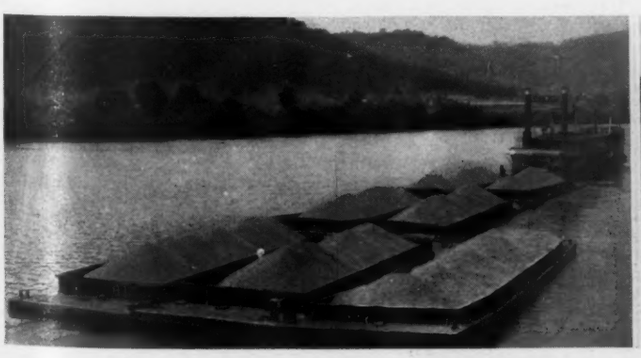
Bellevue Sand and Gravel Co., Bellevue, Iowa, was the only bidder on a U. S. Army Engineer job that could make a sand to meet specifications. The problem was chiefly one of retaining enough fines. The compact dewatering unit shown herewith was used because of the saving in head room and its easy application to the flow sheet of the existing plant. This device was described by its inventor in Rock Products August 27, 1932, but this is the first commercial machine installed. Powered by a 10-hp. motor it turns out 90 tons of sand per hour. It consists of a shallow circular pan or tank with rotating disk and scoops. The number of scoops and the speed of rotation determine the amount of fine sand retained. The discharge is dry enough for truck loading. As much as 1500 cu. yds. of this sand has been shipped from this plant in trucks in one day



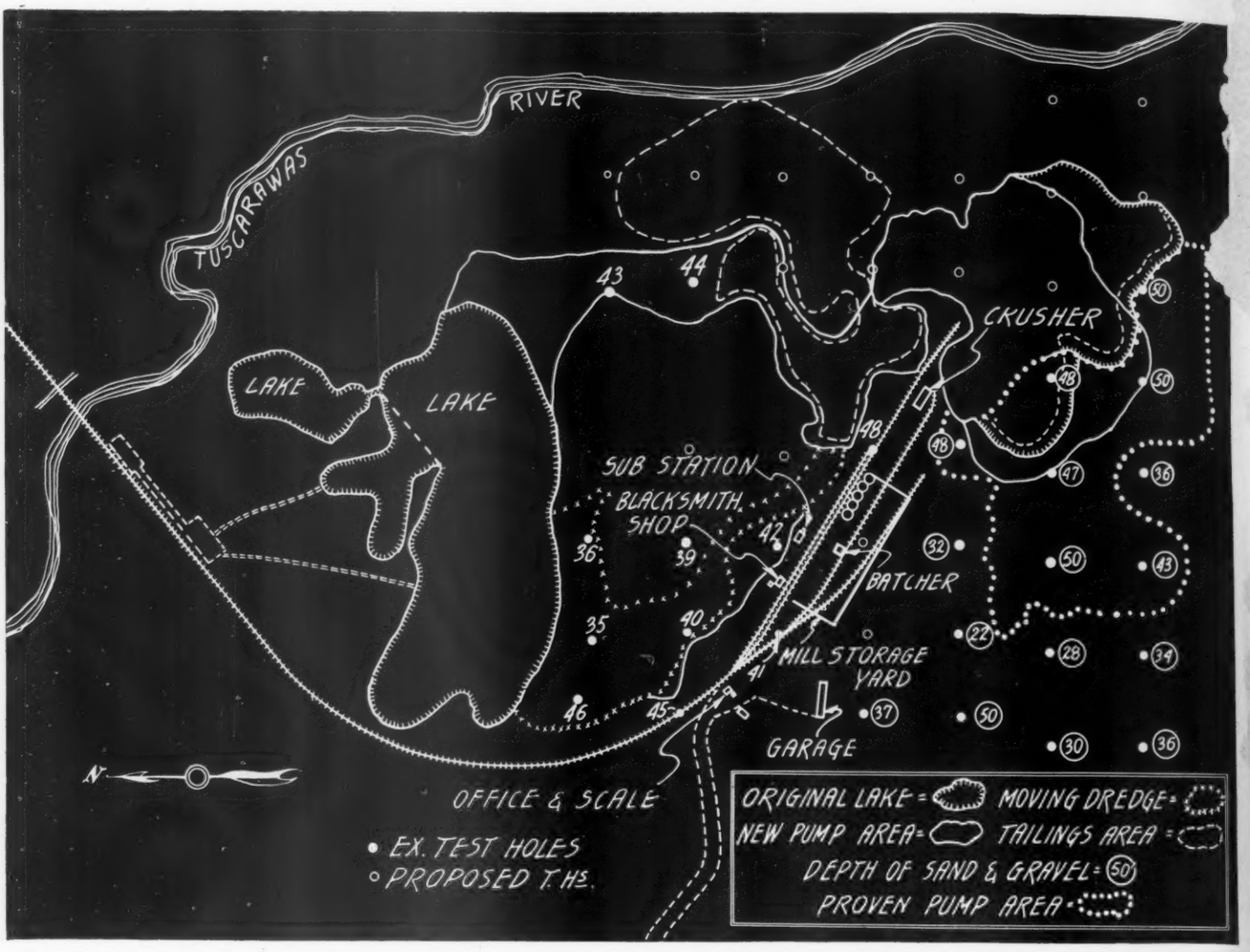
Left: Plant of Ohio River Sand and Gravel Co., New Martinsville, W. Va., to be put in operation in February. Colored areas indicate location of new trackage, derrick and crane handling equipment for storage and shipping

George Vang, president, Ohio River Sand and Gravel Co., and associated companies

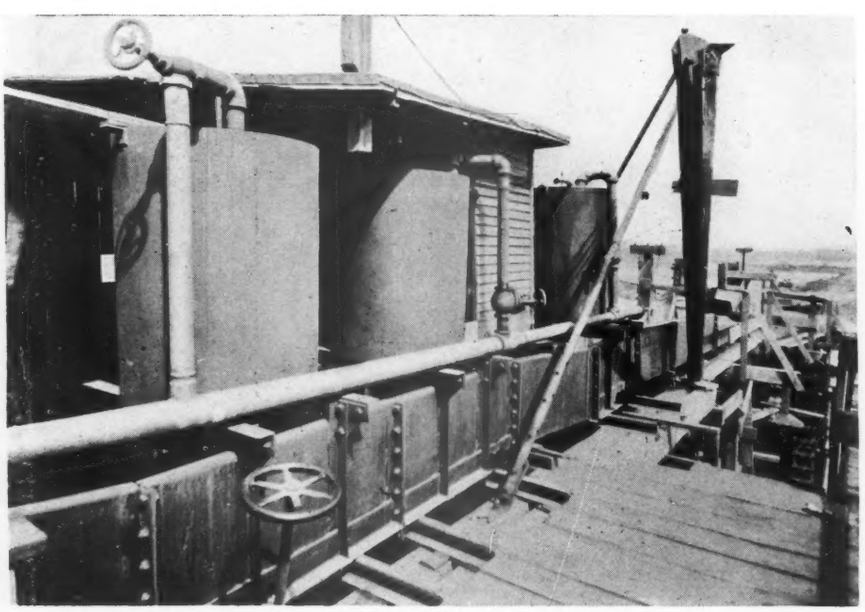
Although there was some talk of a government-operated plant to supply aggregates for the Tygart River dam, Private Enterprise as represented by George Vang, president of the Ohio River Sand and Gravel Co. proved to be the successful bidder for approximately 2,200,000 tons of sand and gravel—largest aggregates contract on record east of the Mississippi. (Ohio Valley Sand Co., another Vang company, with a plant at New Martinsville, W. Va., will supply a small portion of the material.) The contractor: Frederick Snare Corp. The price: 60 cents a ton f.o.b. cars



Two views of equipment at New Martinsville, W. Va., being primed for a spring shipment schedule of 80 cars a day

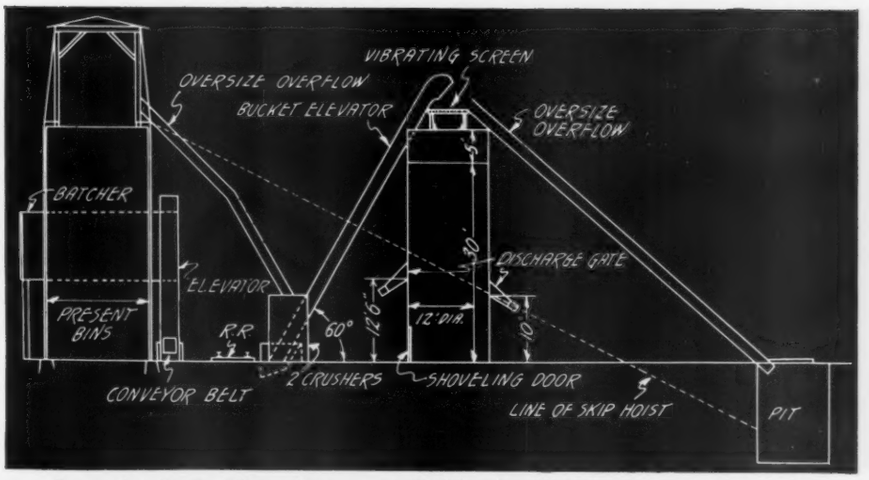


How a progressive sand and gravel operator schedules operations in advance. The chart shows location of test holes, lake and plant units on property of Rubber City Sand and Gravel Co., at Krumroy, Ohio, near Akron. In order to meet new Ohio state highway specifications, the company in 1934 added sand classifiers to its equipment, which includes the usual types of 12-in. dredge, dredge elevator, scalping screen, crusher, conical and vibrating screens, and sand separators

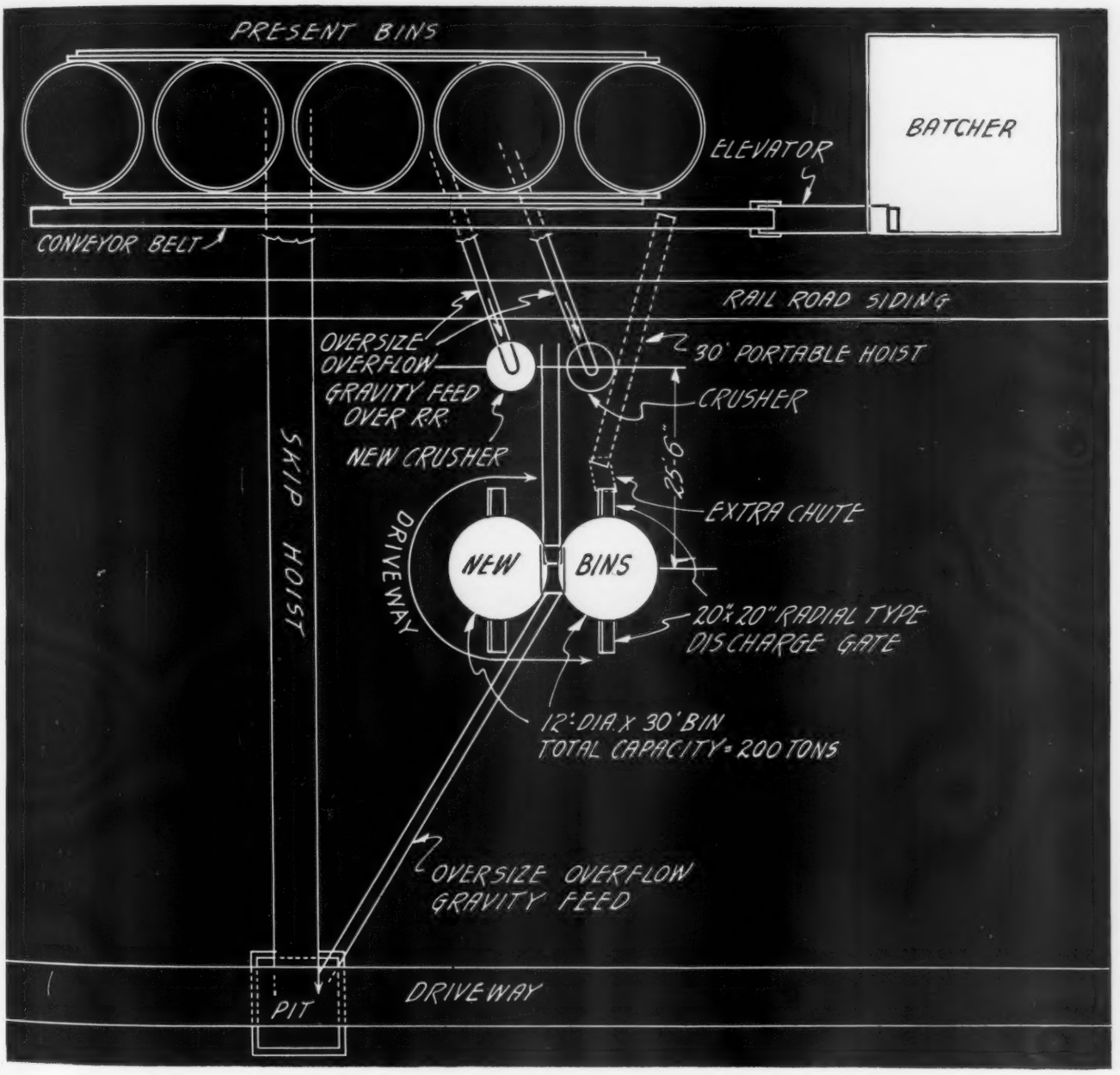


Sand classifiers installed last summer for Northern Gravel Co., Muscatine, Iowa, as part of its plant modernization completed to permit production of material meeting specifications of U. S. Army Engineers. Rearrangement of bin facilities, conveyors, etc., plus the new equipment has resulted in economical, routine production of three distinct sizes and combinations of them. Actual production records, keyed to Mississippi River dam and lock material contracts secured by the company: 1% retained on No. 200 sieve; 14% on 100; 38% on 50; 43% on 16; 4% on 4; and zero on 3/8-in. sieve

A typical plant modernization project is illustrated by diagrams on this page. To meet two new state highway specifications (No. 4 and No. 6 gravel) the Chillicothe Sand and Gravel Co., Chillicothe, Ohio, has installed a new 30-in. roll crusher and a 4x8-ft. vibrating screen. For handling the new sizes, two new (precast-concrete-unit) bins, of 100-ton capacity each, also were built—and a four-compartment, steel weigh batcher set up to serve contractors' trucks and company's three 3-ton units



As modernized:** Plant diagram of **Chillicothe (Ohio) Sand and Gravel Co.



NOTES ON QUARRY MAINTENANCE METHODS

By Nelson Severinghaus,

Superintendent, Consolidated Quarries Corp., Lithonia, Ga.

THE SEVERE SERVICE placed on a wide variety of machines in a modern quarry makes maintenance a major problem worth considerable study and planning by those in charge. Several features which seem to me to be essential to a good maintenance system are all too often lacking about quarries.

Equipment Record

The first of these is a good record of equipment. Besides a Purchase Order file for equipment which contains all correspondence, prints and catalogs relative to each machine, we keep a loose leaf equipment record. With this are filed drawings of any special parts ordered or made in our own shop. This combination gives a ready reference for correct ordering of repair parts.

Tool Keeping

A second essential is a good tool supply and a good system of keeping up with tools. The best of repair gangs will accomplish little if they frequently have to wait while Sam goes to hunt up a jack that was "last used out about the shovel, I think." For the type of tools used and work done around a quarry, a central tool room with a checking system seems necessary. A few special wrenches, etc., which are often needed at some one place may be kept in a box nearby and put under the care of the foreman or operator, but the majority of tools which have a wider use and must be available for more than one machine are best kept in a central location where they will be available to anyone needing them. A signed slip deposited in the tool compartment or on its hook when a tool is taken out for use gives its location in case it is needed elsewhere and allows it to be charged to the person taking it out in case of failure to return. A few of the less common tools kept in this tool room at our Rock Chapel plant will be mentioned later in discussing their use on specific maintenance problems.

Repair Technique

Following are some methods of handling common repair problems which have proven quite successful in the Rock Chapel quarry:

SHOVELS: On quarry shovels handling abrasive stone such as we have here, dippers require most frequent repair. We find it economical to have a complete spare dipper which can be put in the repair shop while another is in use. A usual repair job on a dipper will consist of: (1) Building up on worn bail ears. This is done by welding on a piece of hard steel bent to conform and over-laying this with manganese steel welding rod applied with the electric welder. This procedure avoids cutting out rivets and re-riveting and is considerably cheaper than new replacement, giving a part with about the same life. (2) Replacing wearing bars on bottom of dipper front. These are heavy cast manganese steel bars made to fit the dipper behind teeth which extend only about one-third of the distance on the outside (see Fig. 1). They are riveted on, catching two of the tooth rivets and having two extra rivets at the lower end. Their use about triples the life of a dipper front. (3) Replacement of latch plates worn thin. We now use forged steel latch plates in preference to manganese steel. Although they do not last as long, they do not cause as much delay by unexpected breakage. (4) In replacing tooth bases it is important to have a good solid seat for the base at the front of the dipper to prevent throwing the full digging strain on rivets and shearing them. If the front edge of the dipper is worn somewhat by use with a tooth base off for part of a shift, it is built up with the electric welder to original size and shape. We do not find it economical to build up on tooth points as a good grade of manganese rod costs about $0.60 per pound including cost of application. Manganese points cost about $0.20 per pound and some 60% of the weight is used before they are discarded.

Cracks in quarry shovel frame castings are the rule rather than the exception after they have been in service for several years. In patching these, we first bolt or stud on a suitable piece of plate or structural steel with at least as much section as the original casting which has been broken. This patch is then electric welded around all sides (see Fig. 2). Such a patch will seldom fail if bolts or studs are given a tight fit in their holes. As the bolts used are generally ¾ in. or larger, we use a heavy duty air drill for the holes and do the frame drilling with patch clamped in place.

Shovels often have a few odd bolts here and there which tend to break frequently. Where feasible, holes for these are drilled larger and an oversize bolt used. Where this cannot be done, special steel for high strength bolt material is used.

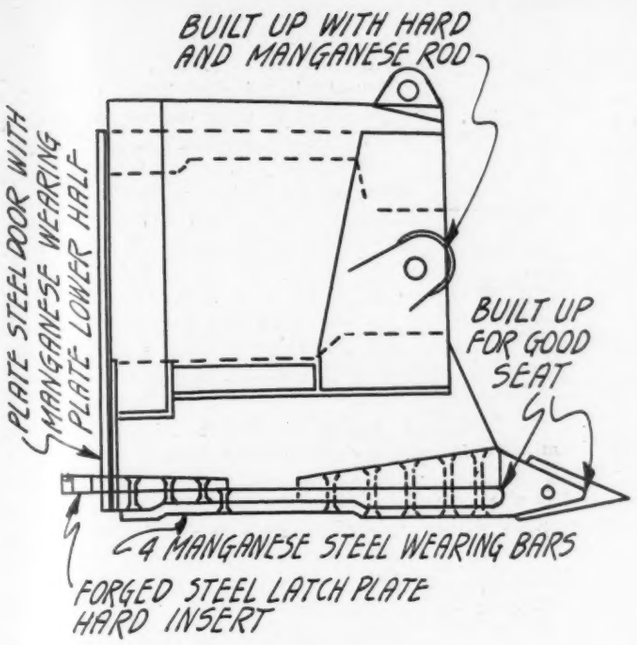
Caterpillar-tread driving sprockets are built up when they become worn. The application of less than 5% by weight of a good hard electric welding rod will avoid an expensive replacement here. Cast-iron caterpillar roller bushings will sometimes break up and crumble out, causing the roller itself to be worn out unevenly. New bushings can be given a tight fit in such a roller by pouring zinc around them. Some pre-heating is necessary to make a good job of this.

We had one through axle become roughened to a point where it was impossible to keep roller bushings in for any length of time. The ends of this axle were turned down so that a ½-in. thick shrink fit steel sleeve could be applied. A separate roller retaining collar was welded on the outer end (see Fig. 3). Bronze bushings were substituted for cast-iron in the rollers at this

First Prize!

SELECTED by a jury of three editors for First Prize—$100—this article by Mr. Severinghaus contains the most material of general interest to all Rock Products' readers; and it illustrates best what our prize competition was designed to bring about—that careful attention to every detail of operation so essential to success under the stress of the conditions we are going through. The selection was a difficult one because many excellent articles were received. These will be published (and paid for) in subsequent issues. Meantime, having "started the ball rolling,"—having proved to operating men that they, more than any one else, can make Rock Products more interesting and helpful—the editors solicit more articles of this kind.—The Editor.

Nelson Severinghaus


BUILT UP WITH HARD AND MANGANESE ROD
PLATE STEEL DOOR WITH MANGANESE WEARING PLATE LOWER HALF
BUILT UP FOR GOOD SEAT
4 MANGANESE STEEL WEARING BARS
FORGED STEEL LATCH PLATE HARD INSERT

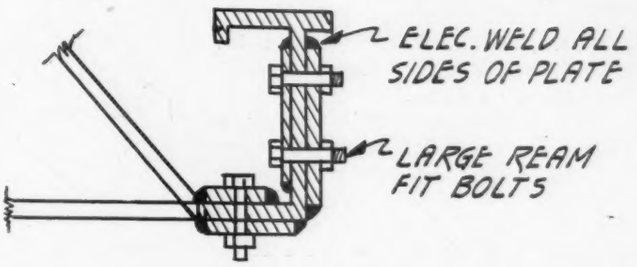


Fig. 1—(Left) replacement of wearing bars behind dipper teeth

Fig. 2—(Above) work diagram for electric welding of patch on shovel frame

point to prevent recurrence of shaft roughening.

QUARRY TRUCKS: Frame reinforcement is a necessity for practically all trucks in heavy duty quarry service. Constant dropping of large rocks in loading will require some added vertical strength while the swaying of a high center of gravity side-dump body on rough quarry roads near the shovel requires lateral reinforcement. A combination of plate and angle bolted and welded to the frame along its central portion answers these requirements (see Fig. 4).

If the total number of trucks at the plant are required to maintain capacity of shovels or crushers, a spare rear end and a spare engine, complete, will cut down lost time. A spare engine can be rebuilt and a rear end re-tired or repaired when mechanics are not too busy with something else and can be installed in short order if a truck fails.

Single solid tires in place of duals have been adopted for replacements as they offer less edge area to be cut off by quarry rocks and prove cheaper per mile in this type of service.

Where possible, parts which have broken frequently such as spring hangers, are replaced with heavier steel castings made locally and machined in our own shop. Frequent breakage of cross members was traced to frame "weaving" and was practically eliminated by frame strengthening mentioned before.

JAW CRUSHER: In replacing thin and cracked jaw wearing plates, it is not unusual to find that the seat has been worn in some places by the harder liner material. Such seats are faced up with mild steel welding rod to secure a solid fit of the new plates. If the wear is severe, the welding is done around suitable size pieces of scrap iron to speed up this work.

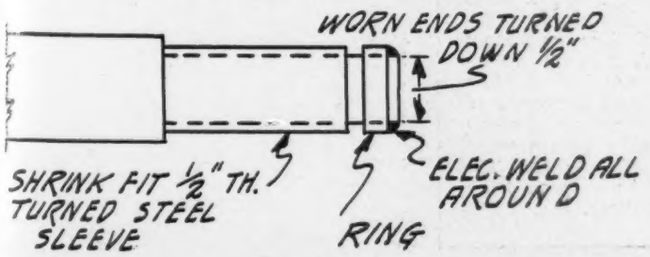
Spring rods which keep movable jaws back against toggles are apt to wear where they go through brackets. This can be avoided by supporting them with a long radius swinging support at their outer end. At Rock Chapel, this is done by notched 2-in. x 8-in. boards standing on the floor some 6 ft. below.

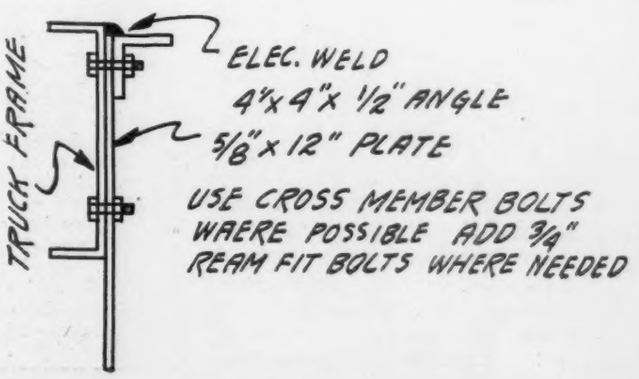
Special head 2-in. bolts which hold jaw plates in place break rather frequently and are difficult to keep tight because of vibration. These bolts are headed in the steel sharpener by means of a special die and threaded on a pipe and bolt threading machine. Single nuts are prevented from working loose by a small electric weld on the bolt threads. This is cheaper and more reliable than a lock nut on such a large bolt and can readily be chipped off for removal of the nut.

Re-lining of eccentric and frame bearings is a much faster and more satisfactory job when done with the aid of mandrels. These were relatively inexpensive when cast locally and finished in our shop. Mandrel and bearing shell are pre-heated with a compressed air-fuel oil blow torch. This torch is also used for melting babbitt out of anchor holes. If the set-up is made quickly after this operation, little more heating of the shell is necessary before pouring. Proper heating of the liner material is governed by a thermometer which covers the required range of temperature. We try to follow the manufacturer's recommendation on this temperature. Ladles large enough to hold the complete batch of metal are made by electric welding heavy sheet steel pieces. These are arranged for a pivot slinging by chain hoist and baffled for pouring from the bottom.

GYRATORY CRUSHERS: Most frequent repair on this crusher is the straightening up of head mantle surface. A slight concavity at the bottom of a mantle makes a considerable cut in the capacity of a gyratory crusher. It is straightened by electric welding with manganese steel welding rod.

Fig. 3—(Below) separate roller retaining collar welded on outer end of axle. Fig. 4—(Right) combination plate and angle bolted and welded to frame





Where depth to be built up permits, pieces of manganese steel plate are added in to speed up the work and lower the cost. Variation of crusher opening greater than can be obtained by raising or lowering the head is achieved by using different thickness mantles. This change is much faster and cheaper than re-setting concaves.

We keep a spare eccentric to allow a quick change when babbitt becomes worn and to give more favorable conditions for babbitting than can be obtained when a rush "off-shift" job is required. The same heating equipment is used for this work as for the jaw crusher.

Cavities in the back of concave segments are filled with a sand-cement mixture some time before they are to be set. If the space to be filled in behind them is still large, small size crushed stone is added in zinc as it is poured, thus cutting down on the amount of zinc required. On older style crushers where the method of excluding dust from working parts is not satisfactory, the use of a "crepe rubber" seal fastened to the bottom of the head will greatly lengthen the life of eccentric and gears.

CONE CRUSHER: As this machine is bronze bushed throughout and crushing liners wear more evenly, about the only repairs necessary are replacement of worn parts. We keep a separate pot for melting zinc for seating head and bowl liners on the cone and concaves on the gyratory to avoid any possible contamination of babbitt used on other jobs. Because of rapid wearing out of oil pumps on the cone, we early substituted an air lift gravity oiling system. This, with the use of a V-belt drive and reversing motor control, allows the crusher to be run in either direction at will to equalize wear on both sides of gears. It has also been found that this crusher will practically do its own change of setting while crushing, if clamping bolts are loosened and direction of rotation is set so that it aids in turning the bowl in the desired direction.

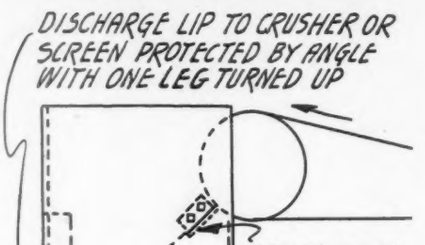

DISCHARGE LIP TO CRUSHER OR SCREEN PROTECTED BY ANGLE WITH ONE LEG TURNED UP
HEAVY SCRAP OF RUBBER BELT STRETCHED WITH ANGLE IRON CLEATS BOLTED AT ENDS

Fig. 5—Scraper made from belting

BELT CONVEYORS: A good rule for the care of conveyors is to let the man responsible for them know that you never want to hear a bearing squeal or see a roller which is not turning freely. Rollers can readily be removed and replaced in the more modern carriers with the belt running and this should be done at the first sign of bearing failure. A roller which is not turning over will quickly have its shell worn through and go to scraping rubber from the belt.

We have found self-vulcanizing plastic rubber quite satisfactory for patching cover snags. This seals moisture out of the fabric, thus delaying rotting. Discarded sections of a heavier belt can be cut down and used to replace broken sections of a smaller belt on lighter duty work. Where material only occasionally sticks to the belt on its return run and where it may damage the belt because of close chute clearance at the head pulley, it can be removed by a scraper formed from a stiff piece of old belting stretched tight from its ends (see Fig. 5). This can cause no damage as it will spring away if anything wedges against it. Wherever feasible, our conveyors are fed from and discharged to stone filled boxes instead of lined chutes to save steel wear. The discharge lips of such boxes will give long service if protected by a piece of structural angle or channel with one leg turned up.

MOTORS: For removing dust from motors and for other miscellaneous uses, our entire crushing plant is served with a ¾-in. compressed air line with convenient outlets. This has a pressure reducing valve at its start which limits the pressure to 30 lb. per sq. in., the maximum which is safe for blowing out motor windings.

A rig which fastens to motor or generator frames is used for smoothing up pitted and scored rings and commutators. This uses regular lathe tools for turning. Final smoothing up is done with sand paper.

GENERAL: A few old truisms well remembered:

Steel rusts and loses value unless protected by paint.

It is just as cheap to keep cleaned up as to allow spillage to accumulate to the inevitable time when it must be removed. A clean plant is a lot better for morale.

A planned repair job is cheaper and more satisfactory than one which sneaks up on you and demands emergency relief.

TUBE-MILL FEED SYSTEM FOR CEMENT CLINKER

By S. G. McAnally,

Chief Chemist, Giant Portland Cement Co., Egypt, Penn.

WE ARE ONE of the type that does not favor publicity, yet if everybody failed to contribute an opinion or an idea, progress would be very slow indeed.

We believe that there has been considerable progress in production methods during the last three or four years. Industry may lag; the incentive to increase machine efficiencies to meet an increasing demand for cement has not existed for several years; yet our engineering and technical staffs have not been idle. If every manager contributed his story of his plant's progress in methods of operation during recent years we would have an inspiring record of real progress.

Our own story is modest, yet we are pleased with what we have accomplished. Only the main process developments will be cited.

In 1931 we changed our raw grinding department from the "open circuit" to the "closed circuit" method of grinding. The advantages of the latter method are too well known to the industry to be recounted. To increase tube-mill production 100% and to reduce power consumption not less than 5 kw. h. per ton was very encouraging. Closed circuit grinding also gives a more uniform finished product than does the open circuit method. Progress in quality is as essential as progress in capacity.

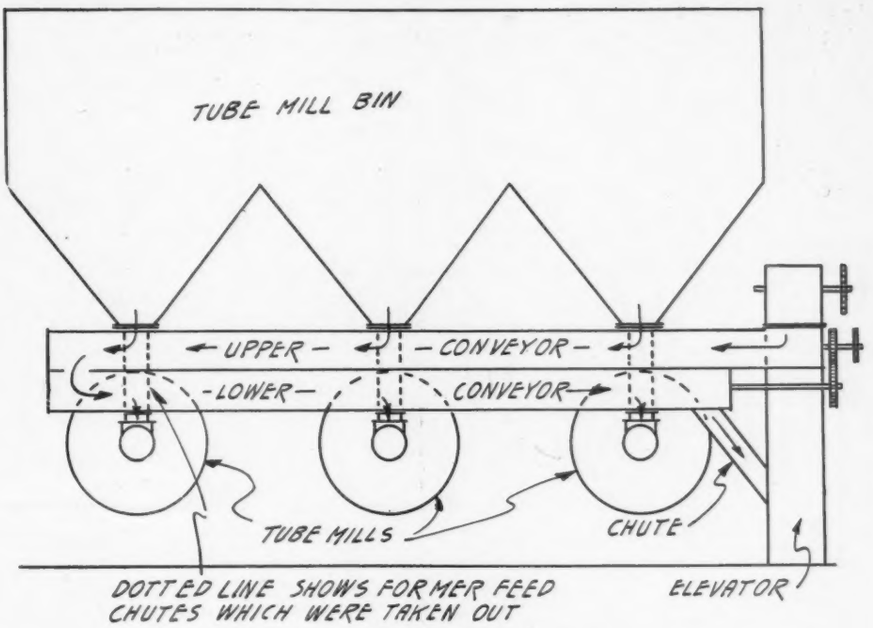
Our kiln room study never ceases, and within the last two years we have installed draft control devices on several of our kilns.

Second Prize!

MR. McANALLY'S article is just about as good an illustration of the enterprising operator's pursuit of profitable operation as the First Prize article. It is hoped his introductory remarks about all live operators contributing their bit of experience will not be overlooked. The industry has suffered for want of such exchange of special knowledge. Mr. McAnally gets a prize of $50 and space rates for this article. More like it would be welcome.—The Editor.

We have found a very satisfactory solution to the problem of feeding a uniform amount of raw mix to the kilns and eliminating "flooding." Our kilns' production has increased gradually each year without sacrificing quality or increasing fuel consumption.

In our clinker grinding department we installed a tube-mill feed system which we believe to be unique. The installation was made in 1931. Prior to that the tube-mills were fed from individual hoppers, which is the common milling practice. All cement operators know that the material arches in the bins and results in alternate periods of "no feed" and "flooding." The effect on fineness and production is considerable; neither is benefited. This arching is a very serious matter in all mills, and the problem is "to get a full conveyor to each mill." We solved it by installing a double screw conveyor under the tube-mill hoppers. The capacity of this conveyor is in excess of the combined maximum production of all the tube-mills. Reference to the attached sketch of the installation will clarify the description. The upper section of the double conveyor is filled by gravity from one or more of the hoppers. (It is improbable that the material in all the hoppers will arch at the same time.) The upper discharges into the lower conveyor in which there are openings over each of the tube-mill feed spouts through which each mill receives its proportion of material as determined by the speed of the tube-mill feed screw. The excess material discharges into a small elevator (part of the new installation) and is returned to the upper conveyor. This system insures sufficient feed to each mill. It increased our tube-mill production about 20%.



Tube mill feed arrangement

A QUARRY BUDGET SYSTEM

By T. W. Jones,

Connecticut Quarries Co., New Haven, Conn.

AS A MEANS of improving operating technique the writer has found a budget system to be most helpful in holding operating costs to a minimum. Our company has, during the past two years, held its *unit* operating cost per ton at practically the same level as in the years of 1929 and 1930, even though the tonnage crushed and shipped was less than half.

In these times of low demand and overproduction the superintendent rarely knows from one week to the next, and quite often from one day to the next, whether or not his plant will operate. For this reason the budget system should be quite flexible and enable the superintendent to compare his costs, whether operating or not, and from our experience it has been found that a budget based upon the tons actually crushed is, to the operating man, the most helpful.

The principal purpose of the budget is to afford the superintendent knowledge of his actual cost from one week to the next and in so doing acquaint him with each item that makes up his total plant cost with the result that he will keep his eye on every penny spent. For this reason the budget costs are divided into two parts, direct and indirect expense, and although the superintendent does not have any control over the indirect or fixed expense, his knowledge of it impresses upon him its importance in non-operating and part-operating times. He realizes the amount of stone that must be shipped to cover this fixed expense and show favorable costs.

A separate budget schedule is made out for each individual plant and furnished to the plant superintendent. The schedule is made up along the lines herewith outlined:

BUDGET FOR PLANT NO. .... FOR 1934

	Basic charge	Amount per ton to be added to basic charge	Tonnage crushed
1. Non-operating week	$ 800.00	.280	*0 to 1000
2. Part-operating week	1080.00	.205	1000 to 4000
3. Full-operating week	1695.00	.165	4000 up

Example: If the tonnage crushed is 2500 tons for the week the amount for budget = 1080.00 + (2500 × .205) = $1592.50.

The fixed expense, including insurance, taxes and depreciation, is $550.00 per week.

Amount chargeable to workmen's compensation is 5% of the total payroll.

Power Schedule

1. Non-operating week ..... $115.00 per week
2. Part-operating week ..... 132.00 + ($.015 × No. of kw.-hrs.)
   (Figure approximately 2 kw.-hrs. per ton)
3. Full-operating week ..... 144.00 + ($.0142 × No. of kw.-hrs.)
   (Figure approximately 1.8 kw.-hrs. per ton)

At the end of each week, the superintendent from this schedule derives the amount which, under normal working conditions, should closely compare with his actual cost. (*For a non-operating week the budget is figured on the tonnage shipped, but in all other cases is derived from the tonnage crushed during the week.)

The superintendent submits his costs each week to the main office on a standard form made up of the following items:

The contingency is carried forward each week and watched closely both at the plant and in the main office. Any large variance from the budget has to be accounted for, and may show up when a large primary blast is fired, or in the event of a breakdown or purchase of an expensive repair part. A more accurate analysis of weekly costs can

be made if the total expense of the primary blast is divided by the estimated number of tons produced by the blast and this cost per ton multiplied by the stone crushed each week and added to the weekly expense. Similarly, expensive repair parts may be charged off on a tonnage schedule based on the estimated life of the part in question. If these items are written off directly their amount in the contingency item should have disappeared before a recurrence of the same expense.

A duplicate of every invoice for material purchased is mailed to the particular plant which receives the material, and its cost is charged off during the week it is received. Supplies such as dynamite, gasoline, coal, oil and grease are charged off on the inventory as they are used, and each plant is given a schedule of the prices that apply to these supplies.

As was stated previously, the budget schedule must necessarily be figured separately and will vary for each plant. An accurate schedule can be drawn up only after a careful study of the costs at each plant has been made over a period of years. The basic charge under item No. 1 of the budget schedule is the sum of the fixed expenses and overhead expenses at the plant; the overhead expense includes the minimum power bill, if any, and the minimum payroll. This basic charge is, to sum it up, all expenses incurred at the plant, even though the plant is not operated. The tonnage of 0 to 1000 is the amount of stone that may be shipped from storage during the week by means of the existing storage facilities with the normal amount of storage labor.

The amount per ton to be added to the basic charge will therefore necessarily depend on the loading and storage facilities and may be determined from past experience, making allowance for changes in wages and prices of supplies. Parts 2 and 3 of the schedule are figured in a similar manner; the basic charge being the amount required to produce the minimum amount of stone shown, and the amount per ton to be added, incorporating only those items which increase directly with production.

Before the adoption of the budget system the superintendent's knowledge of his costs was limited to his payroll and the amount of supplies being used, except at the end of the month, when the summary of the previous month's costs were given. He did not know the actual cost of the supplies and materials being used and did not, therefore, appreciate their full value. The superintendents assure us that, since they have had a more accurate understanding of their costs, they have found ways and means of cutting expenses that they had overlooked before. Therein lies the principal value of the budget.

The preceding paragraphs deal entirely with the operating costs for the plants alone and do not include selling, administrative and general office expense. These items are budgeted on a monthly basis and not according to tonnage. As they are practically constant throughout the year a budget system for them is easily prepared. This matter is mentioned because they form a definite proportion of the total expense and should not be overlooked in the complete analysis of costs.

The value of the budget varies proportionately with the accuracy with which it is drawn up and also with the accuracy in which expenses are reported by the plants. For this purpose a monthly check-up is made of all expenses and compared with the budget. During 1934 the total operating expenses of this company were held within a tolerance of four-tenths of one per cent of the budget. It is rather absurd to expect that this accuracy can be maintained at the start, for the experience of this company the first year was not as favorable. Yet it was close enough to warrant repeating, and the results obtained are so satisfying as to indicate that a fair degree of accuracy can be obtained.

At the start the budget should be open to the criticism of the superintendents. It may be necessary to make revisions in the budget at the start, and it should, of course, be kept up-to-date at all times.

There are many seemingly minor ways of cutting corners and reducing operating costs that may be suggested by each superintendent, but there is no one method that will develop them faster and more completely as will the adoption of some budgeting system, provided it has sufficient flexibility and accuracy to meet all operating conditions.

Third Prize!

QUITE AS IMPORTANT as plant operating methods in these days of stress are other methods and means to keep costs in line with much reduced production. Mr. Jones' article admirably illustrates this. It also brings out a very important point—that is, making the superintendents real partners in the enterprise. Mr. Jones' employer has long recognized this, and has for a long time given the superintendents more knowledge of costs than many other corporations. Mr. Jones' article is a natural follow-up of one by S. E. Honey, of the Stewart Sand and Material Co., Kansas City, Mo., published in Rock Products, December 31, 1932, in which was described a similar budget system and its use. Mr. Jones gets the Third Prize of $25, in addition to payment for his article at space rates. How many others have had experience with budget systems? The editors will be glad to hear.—The Editor.

WEEKLY EXPENSE

Date.....

For the week ending.....Plant No.....Crushed.....Tons of stone and shipped.....tons, and the expenses were as follows:

Total Payroll	$.....
Workmen's Compensation	.....
Total Inventory (Gasoline, Dynamite, Coal, Oil and Grease, etc.)	.....
Material received other than on Inventory (Repair Parts, etc.)	.....
Power	.....
Trucking Payroll (Plant work only)	.....
Miscellaneous	.....
A. Total Direct Expense	.....
B. Fixed or Indirect Expense	.....
Total Expense	.....
Allowed Expense (as per Budget)	.....
Contingency	.....

.....Supt.

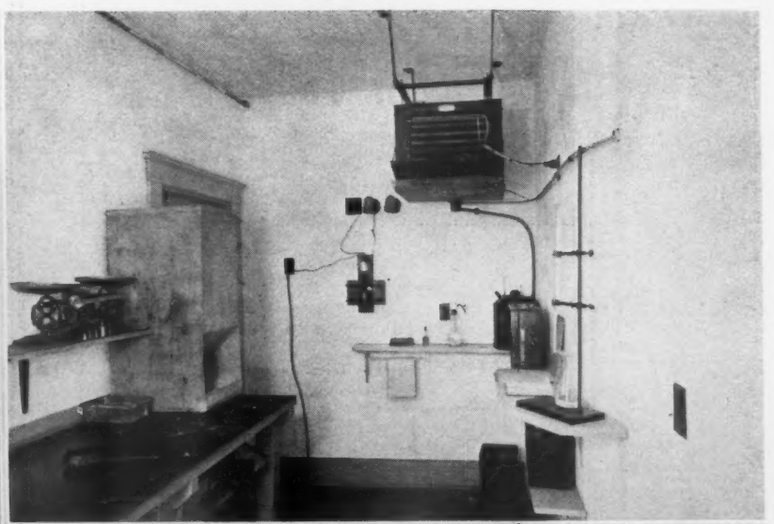
Publications Received

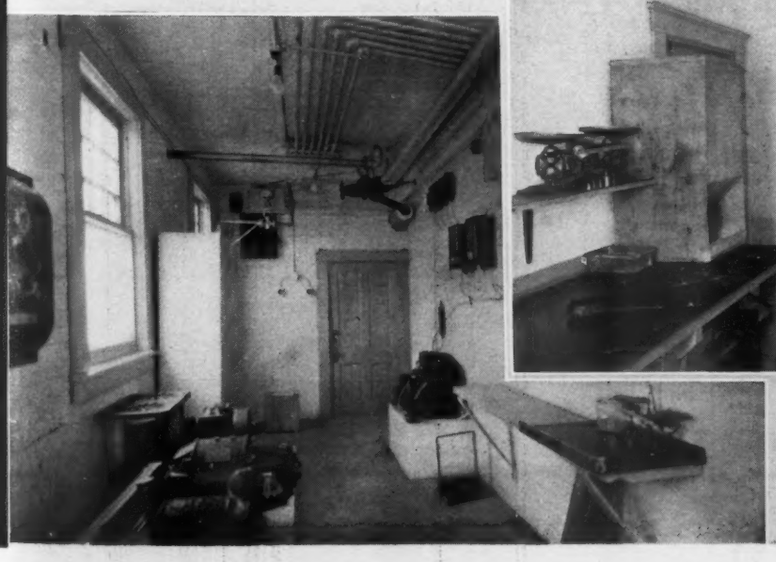
Federal Securities Act Procedure. By J. K. Lasser and J. A. Gerardi, McGraw-Hill Book Co., New York City, price $4.00. Every executive of a stock company will sooner or later have to acquire an understanding of the Federal Securities Act of 1933, amended in 1934. The authors say the act is an understandable and workable instrument and not so permeated with technicalities and snares that legitimate financing may not proceed in the face of its requirements. As always, of course, the details of new financing will be handled by financial agencies and lawyers, but no business executive's education will be complete if he does not understand something of it himself. This book will give him that understanding, and while it would be dry reading, to read it through at one sitting, it will prove a mighty handy reference volume for answering questions as they arise. J. K. Lasser is a public accountant and J. A. Gerardi is an attorney; their book, they say, is written in the language of the accountant and the business executive.

Asbestos—Domestic and Foreign Deposits. By Oliver Bowles. Information Circular 6790, U. S. Bureau of Mines. This paper is a section of a forthcoming report covering major phases of the asbestos industry and a limited number of copies are available in mimeograph form. The United States produces only 1½ to 3% of the asbestos required for products made in this country. Although there are numerous deposits in this country few have been developed on a real commercial scale and few can compete in quality with the imported fibre.

Latest in Cement Laboratories

Above: New moist closet in control room of Lehigh Portland Cement Co., Oglesbee, Ill., one of several at this company's plants, designed for making and testing specimens under constant conditions of temperature and humidity. Below at right: Equipment for particle size and surface area determination with accessory apparatus in opposite end of control room. Below, at left: Refrigerating unit, test grinding equipment, etc., outside control room. (See early issue of Rock Products for diagrams and details.)





DAILY REPORT OF OPERATIONS

C. C. BEAM, Inc.

Date May 31 193.4.

Hours Plant was in operation	8 Hours	Minutes
Hours Plant was in actual production	6 Hours	5 Minutes
Hours Plant lost to production	1 Hours	55 Minutes

REASONS FOR LOST TIME

30	Min at A M acct	Cone Crusher Down	
10	Min at M acct	Reserve Bin Full	
10	Min at M acct	" " "	
10	Min at M acct	" " "	
10	Min at M acct	" " "	
10	Min at M acct	" " "	
	Min at M acct		
	Min at M acct		
	Min at M acct		

5	Min at P M acct	Starting
10	Min at M acct	Reserve Bin Full
5	Min at M acct	Big Stone
5	Min at M acct	" "
10	Min at M acct	Reserve Bin Full
	Min at M acct	
	Min at M acct	
	Min at M acct	

LABOR DISTRIBUTION

	Men Stripping	Hours
6	Men Drilling and Blasting	38½ Hours
5	Men Quarry	40 Hours
3	Men Quarry Transportation	24 Hours
9	Men Crush, Screen and Wash	64½ Hours
5	Men Load and Store	40½ Hours
	Men Repairs	Hours
1	Men Misc Labor	½ Hours
1	Men Gravel Plant	2½ Hours
	Men	Hours
		210¼

PRODUCTION

	From Bins	From Storage
Stone loaded in R. R. Cars	321.00 Tons	Tons
Stone loaded in trucks	101.40 Tons	29.20 Tons
Stone to Asphalt Plant	56.90 Tons	Tons
Stone to	Tons	Tons
Total Shipments	479.30 Tons	29.20 Tons
Stone to STORAGE	490.00 Tons	
Total Production	969.30 Tons	

Trucks Dirt in stripping operation

4 Holes 132 feet in drilling operation

106 Trucks Stone in quarry operation

RECAPITULATION

STRIPPING		Trucks of dirt per man-hour
DRILL AND BLAST	6.7	Feet per man-hour
PRODUCTION	5.7	Tons per man-hour
PLANT EFFICIENCY	76	%

Efficiency of operation is of prime importance to any operator any time—doubly so in times like these. First step is to find out the causes of delays and lost time. This form is used at the plant of C. C. Beam, Inc., Melvin, Ohio. Foremen, or workmen in charge, report on slips of paper; timekeeper and engineer make the record

Weekly Summary

DAILY REPORT OF OPERATIONS

C. C. BEAM, Inc.

Week ending
Date May 21 1934

Hours Plant was in operation	29 Hours	30 Minutes
Hours Plant was in actual production	26 Hours	50 Minutes
Hours Plant lost to production	2 Hours	40 Minutes

REASONS FOR LOST TIME

30	Min at	A M acct Starting	5	Min at	P M acct Starting
30	Min at	M acct Big Stone	20	Min at	M acct Screen Trouble
15	Min at	M acct Out of Stone	10	Min at	M acct Hot Bearing
15	Min at	M acct Bin Full		Min at	M acct
35	Min at	M acct Choke Up		Min at	M acct
	Min at	M acct		Min at	M acct
	Min at	M acct		Min at	M acct
	Min at	M acct		Min at	M acct

LABOR DISTRIBUTION

Men Stripping	1½	Hours
Men Drilling and Blasting	132	Hours
Men Quarry	157½	Hours
Men Quarry Transportation	118½	Hours
Men Crush, Screen and Wash	298½	Hours
Men Load and Store	179½	Hours
Men Repairs	3	Hours
Men Misc Labor	3	Hours
Men Gravel Plant	12	Hours
Men		Hours
	905¾	

PRODUCTION

	From Bins		From Storage	
Stone loaded in R. R. Cars	1681.70	Tons	33.65	Tons
Stone loaded in trucks	579.25	Tons	673.10	Tons
Stone to Asphalt Plant	46.85	Tons		Tons
Stone to		Tons		Tons
Total Shipments	2307.80	Tons	706.75	Tons
Stone to STORAGE	1245.00	Tons		
Total Production	3552.80	Tons		

Trucks Dirt in stripping operation

13 Holes 429 feet in drilling operation

500 Trucks Stone in quarry operation

RECAPITULATION

STRIPPING		Trucks of dirt per man-hour
DRILL AND BLAST	5.2	Feet per man-hour
PRODUCTION	4.7	Tons per man-hour
PLANT EFFICIENCY	91	%

Same form is used for weekly summary shown here, but the forms are different colors to distinguish them. These are actual records, thanks to the courtesy and generosity of C. C. Beam. Weekly comparisons are valuable in increasing efficiency

Monthly Summary

DAILY REPORT OF OPERATIONS

C. C. BEAM, Inc.

Date Month of May 193 4

Hours Plant was in operation	118 Hours	45 Minutes
Hours Plant was in actual production	102 Hours	20 Minutes
Hours Plant lost to production	16 Hours	25 Minutes

REASONS FOR LOST TIME

40	A M	Starting	25	P M	Starting
135	M	Big Stone	135	M	Screen Trouble
75	M	Out of Stone	10	M	Hot Bearing
325	M	Bin full	75	M	Cone Crusher
35	M	Water Supply	25	M	NH Crusher
65	M	Choke Up	10	M	Cleaning Bin
20	M	Feeder Down	5	M	Plant Down
	M		5	M	Elevator

LABOR DISTRIBUTION

Men Stripping	710	Hours
Men Drilling and Blasting	603½	Hours
Men Quarry	705½	Hours
Men Quarry Transportation	469½	Hours
Men Crush, Screen and Wash	1239¾	Hours
Men Load and Store	740	Hours
Men Repairs	3	Hours
Men Misc Labor	17½	Hours
Men Gravel Plant	37	Hours
Men 7B	11½	Hours
	4536½	

PRODUCTION

	From Bins	From Storage
Stone loaded in R. R. Cars	3646.75 Tons	860.55 Tons
Stone loaded in trucks	3669.175 Tons	3186.25 Tons
Stone to Asphalt Plant	363.30 Tons	95.45 Tons
Stone to	Tons	Tons
Total Shipments	7679.225 Tons	4142.25 Tons
Stone to STORAGE	5695.00 Tons	
Total Production	13374.225 Tons	

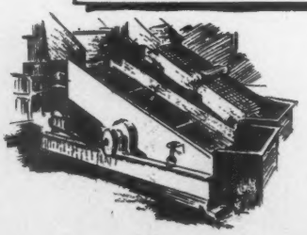
4904 Trucks Dirt in stripping operation

54 Holes 1794 feet in drilling operation

1906 Trucks Stone in quarry operation

RECAPITULATION

STRIPPING	6.9	Trucks of dirt per man-hour
DRILL AND BLAST	5.3	Feet per man-hour
PRODUCTION	4.2	Tons per man-hour
PLANT EFFICIENCY	86	%



Monthly summary is also made on the same form as daily and weekly, using a color scheme to distinguish them. These forms give emphasis to causes of lost time, but they also contain all the production records and data for labor cost distribution

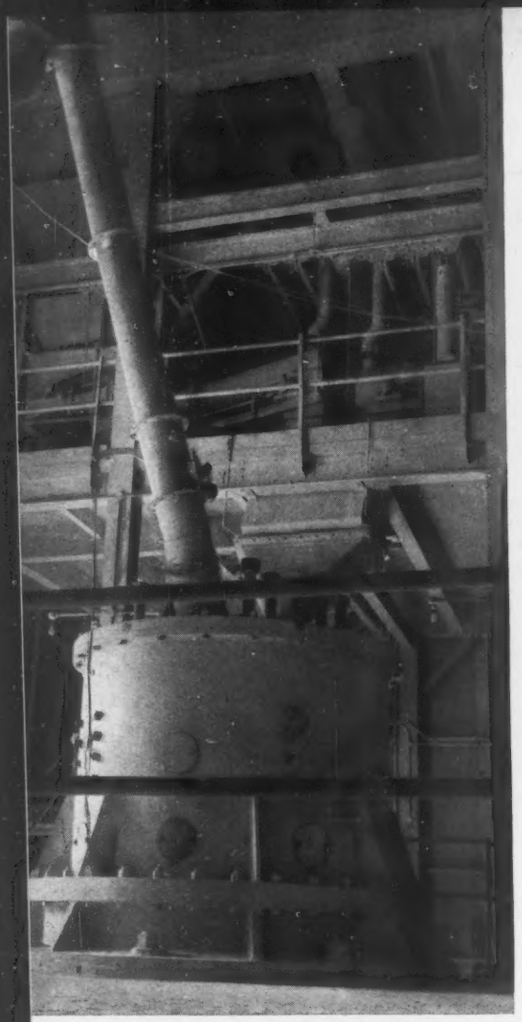
YEARLY REPORT OF LOST TIME AND EFFICIENCY

C. C. BEAM, Inc.

Lost Time and Efficiency—1933 — **Melvin, Ohio**

	January	February	March	April	May	June	July	August	September	October	November	December	Year	%	Change
Starting	.25	....	.17	.25	2.25	.58	.58	2.83	5.42	1.58	8.08	11.33	33.32	23.95	+8.47
Quarry	3.17	.75	1.25	4.25	3.17	2.58	1.33	2.50	5.00	5.33	6.75	9.83	45.91	33.00	—6.98
Big stone	1.25	.58	.42	1.25	2.00	1.33	1.25	2.42	2.67	1.75	3.00	4.50	22.42	....	.....
Out of stone	1.92	.17	.83	3.00	1.17	1.25	.08	.08	2.33	3.58	3.75	5.33	23.49	....	.....
Shovel	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....
Transportation	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....
Miscellaneous	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....
Plant	.75	.58	.17	5.15	8.83	2.16	1.50	2.75	5.08	5.50	1.99	7.67	42.13	30.30	+4.32
Hoist	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....
Crushers	....	.50	....	.75	3.17	....	....	1.17	.33	.83	1.08	1.00	8.83	....	.....
Feeders	.75	.08	.17	2.92	.58	.83	....	....	.58	....	....	2.08	7.99	....	.....
Elevators	....	....	....	....	.08	....	.67	....	2.58	.42	....	....	3.75	....	.....
Screens	....	....	....	....	4.00	.83	....	1.25	.92	.17	.58	3.67	11.42	....	.....
Conveyor	....	....	....	....	....	....	.83	.25	....	....	....	....	1.08	....	.....
Spouts	....	....	....	.15	.33	....	....	....	....	....	.25	.67	1.40	....	.....
Bins	....	....	....	1.33	.67	.50	....	.08	.17	....	....	....	2.75	....	.....
Sand drags	....	....	....	....	....	....	....	....	.50	4.08	....	....	4.58	....	.....
Miscellaneous	....	....	....	....	....	....	....	....	....	....	.08	.25	.33	....	.....
Load and store	.83	....	....	.60	.50	.25	....	.50	1.17	1.92	4.09	1.75	11.61	8.35	+1.24
Power	.17	....	....	.67	....	.50	....	....	.58	1.16	....	.50	3.58	2.58	—3.15
Engines	.17	....	....	....	....	.50	....	....	....	....	....	.50	1.17	....	.....
Power plant	....	....	....	.67	....	....	....	....	....	....	....	....	.67	....	.....
Power company	....	....	....	....	....	....	....	....	.58	.83	....	....	1.41	....	.....
Miscellaneous	....	....	....	....	....	....	....	....	....	.33	....	....	.33	....	.....
Inspection	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	—.97
Administration	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	—.97
Water supply	.08	....	....	....	.33	.33	1.00	.50	.17	....	.25	....	2.66	1.91	—.29
Crane	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....
Weather	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	—1.58
Miscellaneous	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....
Total	5.25	1.33	1.59	10.92	15.08	6.40	4.41	9.08	17.42	15.50	21.16	31.08	139.22	....	—114.49
Plant in operation	116.25	26.25	15.75	94.75	96.00	47.67	19.00	63.75	127.83	152.50	121.00	136.00	1,016.75	....	—871.32
Plant in production	111.00	24.55	14.17	83.83	80.92	41.27	14.59	54.67	110.41	137.00	99.84	104.92	877.50	....	—756.83
Lost time	5.25	1.33	1.59	10.92	15.08	6.40	4.41	9.08	17.42	15.50	21.16	31.08	139.25	....	—114.49
Efficiency (%)	95.50	93.50	90.00	88.40	84.20	86.60	76.75	86.00	86.50	89.90	82.50	77.10	86.40	....	—.10
Production (tons)	13,110.99	3,029.07	1,727.22	10,603.93	9,481.48	4,515.75	2,381.15	7,021.03	11,812.03	17,096.70	12,604.65	13,758.45	107,142.45	....	—108,945.00
Tons per plant hour	112.80	115.50	109.70	112.00	98.80	94.70	125.50	110.00	92.40	112.10	104.20	101.20	105.40	....	—9.10
Tons per production hour	118.20	123.50	122.00	126.80	117.30	109.50	163.20	128.30	106.90	124.80	126.30	131.10	122.20	....	—10.10
Man hours	3,429.50	1,273.00	1,823.25	2,764.00	3,114.50	1,654.50	1,041.50	1,719.50	3,012.00	4,337.50	3,009.50	2,995.50	30,174.25	....	.....
Tons per man hour	3.82	2.38	.95	3.84	3.03	2.74	2.29	4.09	3.92	3.94	4.19	4.59	3.56	....	+.53

On the three preceding pages the "Daily Report of Operations" forms used by C. C. Beam, Inc., Melvin, Ohio, are shown as utilized for daily, weekly and monthly summaries of operation. Here is how data taken from such reports are recapitulated for yearly review. Through such detailed reports, managers are enabled to detect weak spots in production programs, and to place proper credit where due

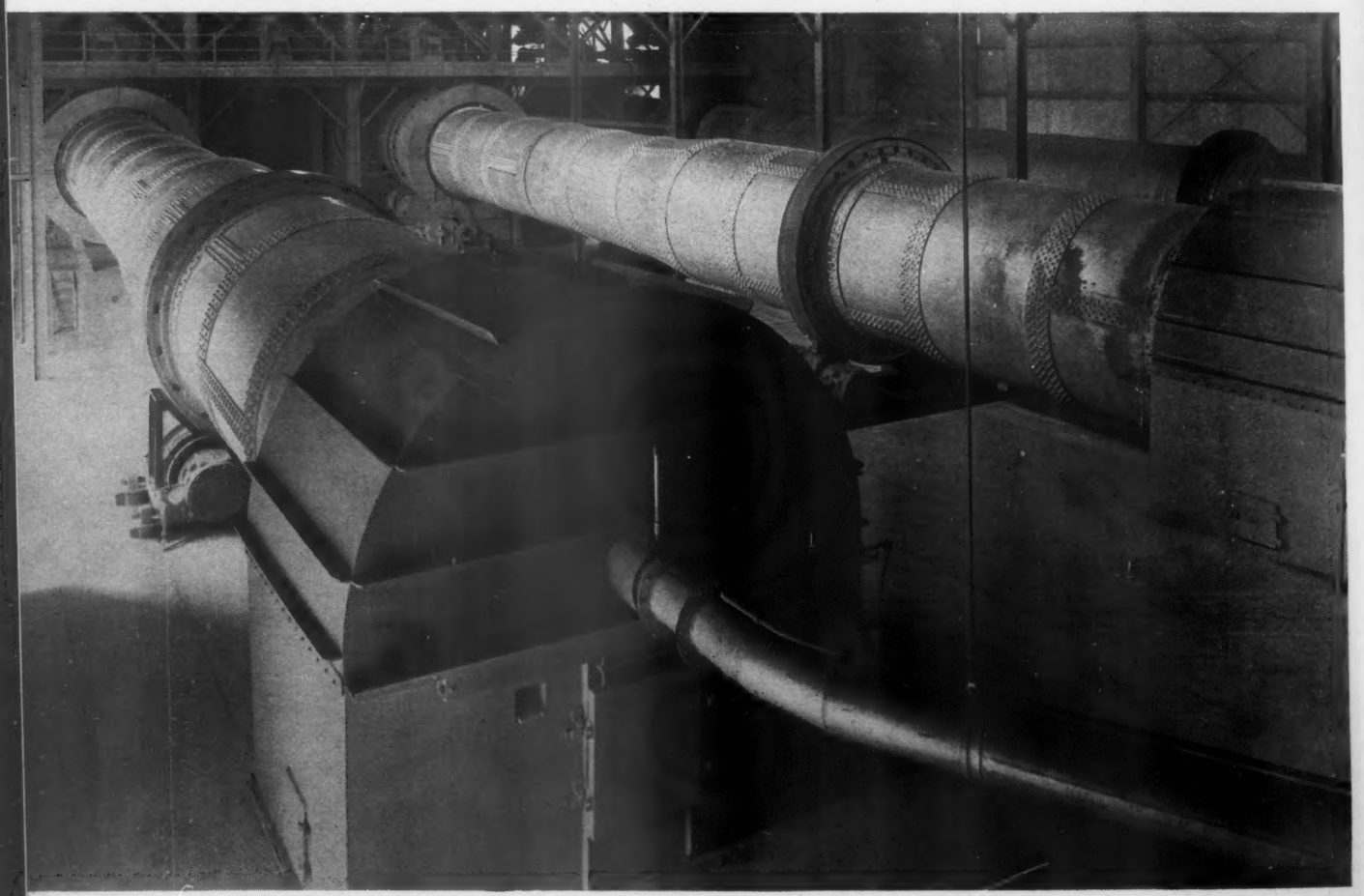


New Equipment Gives

On this and the following three pages, pictures tell the story of two cement mill modernization programs involving an expenditure of more than $1,500,000.

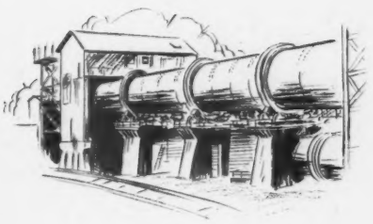
Left: New roller bearing mill which replaced a battery of old-style tube mill units in the Alpha Portland Cement Co. plant at Cementon, N. Y. Above is seen the automatic weighing and proportioning apparatus (also illustrated at the top of this page) for stone and clay. Equipped with rheostat to govern the rapidity of discharge, this unit proportions 500 pounds of stone with the required amount of clay.

Below: Two kilns, rebuilt and furnished with new drives, which are fed from the new grinding unit. The third kiln, in background, will be rebuilt at later date. (See views on opposite page.)

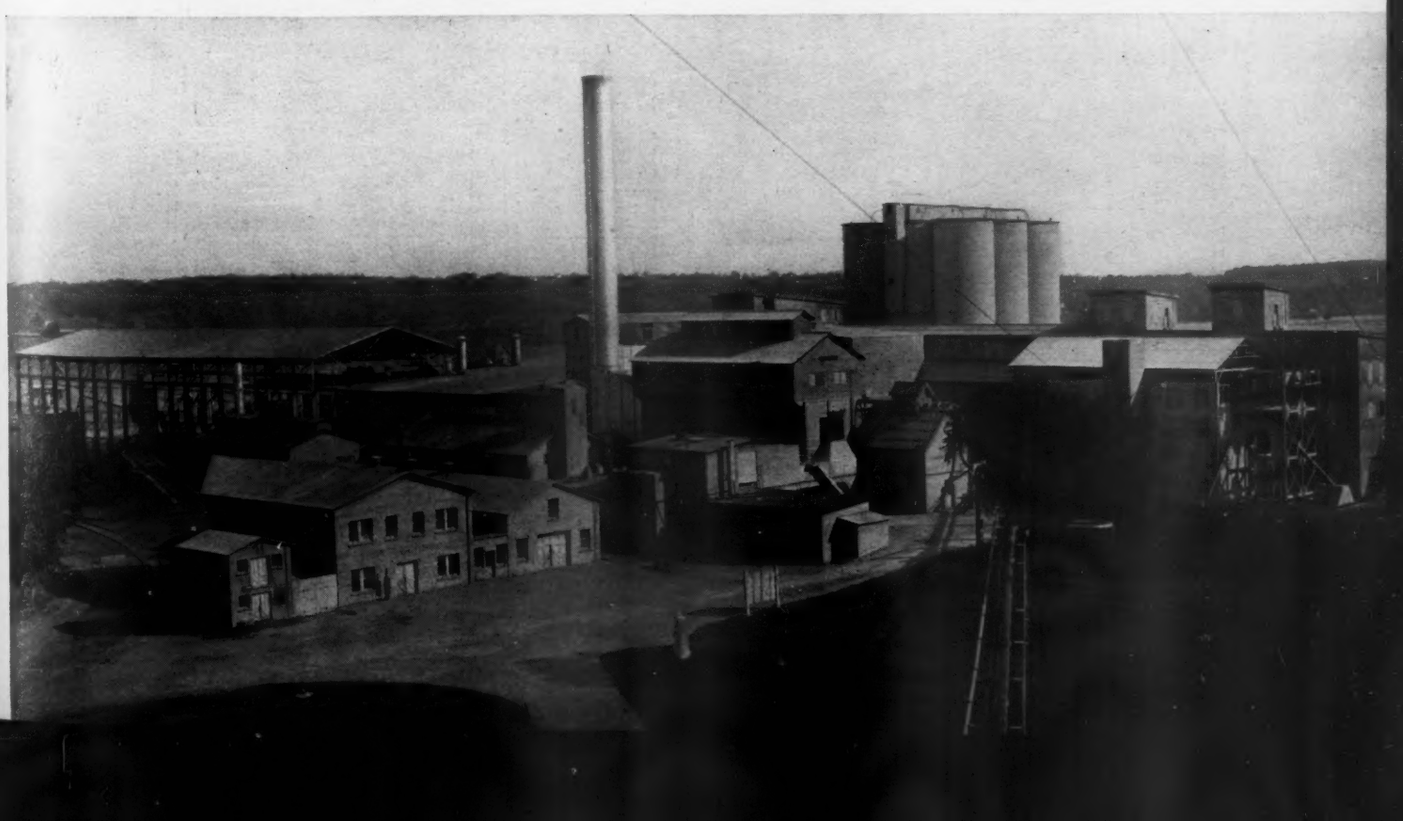


Cement Mills Production Economies

Above: Kiln room floor in Alpha Portland Cement Co. plant, Cementon, N. Y. Central control is provided by the instrument panel shown in center. (New clinker cooler equipment recently installed as part of this plant improvement project, is shown on Page 86.) During the years 1933 and 1934, the company has invested a total of approximately $650,000 in re-equipping the property. All work was directed by the engineering department at the company's general office in Easton, Pa.



Below: Alpha Portland Cement Co. plant as modernized at Cementon, N. Y. An important feature of the work now complete is an addition to its steam plant (see Rock Products, January, 1935, Page 40), which makes the plant "self-contained" as to power requirements. Pipeline in foreground leads to power house adjacent to the plant office from which this view was taken. Installation of new equipment and construction of new buildings and additions have given continuous employment to 200 workmen during the past three years. Plant capacity at Cementon has not been expanded, the objective being to have production facilities which will allow efficient operation on a nominal amount of business.

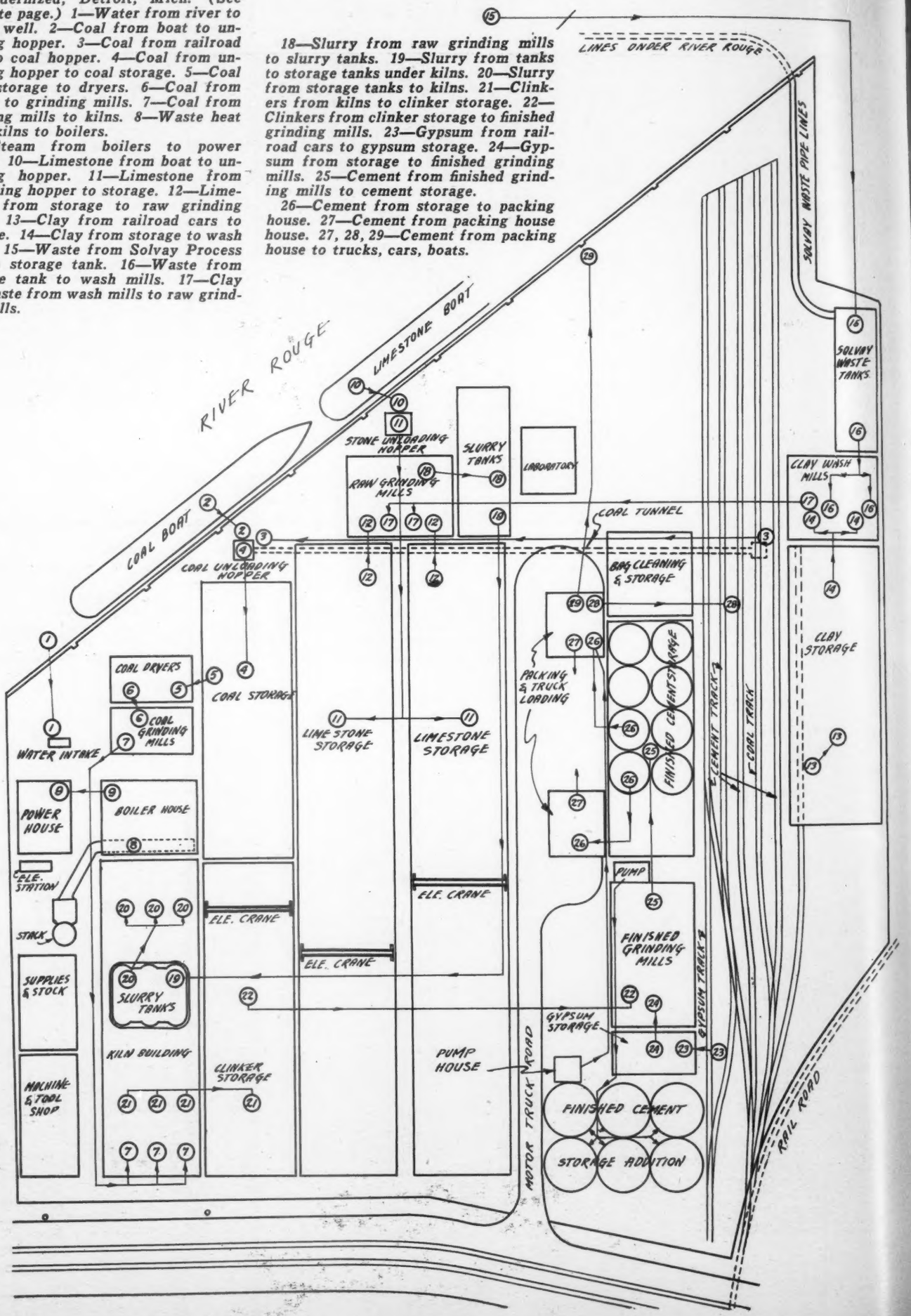


Peerless Portland Cement Co. plant as modernized, Detroit, Mich. (See opposite page.) 1—Water from river to intake well. 2—Coal from boat to unloading hopper. 3—Coal from railroad cars to coal hopper. 4—Coal from unloading hopper to coal storage. 5—Coal from storage to dryers. 6—Coal from dryers to grinding mills. 7—Coal from grinding mills to kilns. 8—Waste heat from kilns to boilers.

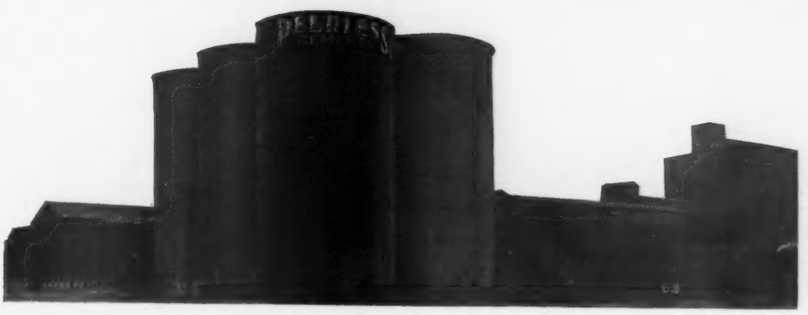
9—Steam from boilers to power house. 10—Limestone from boat to unloading hopper. 11—Limestone from unloading hopper to storage. 12—Limestone from storage to raw grinding mills. 13—Clay from railroad cars to storage. 14—Clay from storage to wash mills. 15—Waste from Solvay Process Co. to storage tank. 16—Waste from storage tank to wash mills. 17—Clay and waste from wash mills to raw grinding mills.

18—Slurry from raw grinding mills to slurry tanks. 19—Slurry from tanks to storage tanks under kilns. 20—Slurry from storage tanks to kilns. 21—Clinkers from kilns to clinker storage. 22—Clinkers from clinker storage to finished grinding mills. 23—Gypsum from railroad cars to gypsum storage. 24—Gypsum from storage to finished grinding mills. 25—Cement from finished grinding mills to cement storage.

26—Cement from storage to packing house. 27—Cement from packing house house. 27, 28, 29—Cement from packing house to trucks, cars, boats.

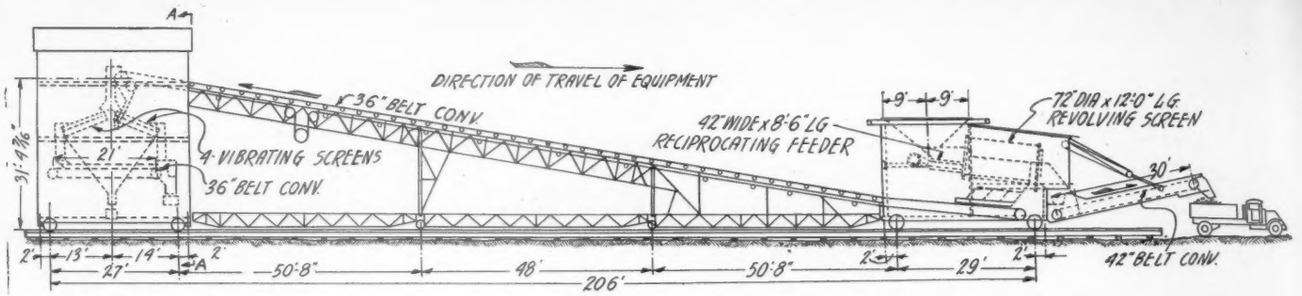


Although the plant of Peerless Portland Cement Co., Detroit, Mich., detailed on these two pages was new only 10 years ago, nearly a million dollars' worth of plant improvements have been added. Latest installation, with the exception of new laboratory equipment to handle tests on extra-fine high-early-strength cements, is shown at the right. This new dust collecting system has a two-fold function: ventilation of the compartment mill in order to reduce temperature of cement leaving the mill and to remove moisture liberated during pulverizing. The unit has no moving parts, and requires no screens in conjunction. Additional grinding equipment, 50-ft. diameter storage tanks (shown at right, center) served by suction trunks, and power plant improvement are among the other modernization features of this plant to be reviewed in an early issue of Rock Products.



Portable Plants Gain Headway

Permanent washing plant of J. L. Shiely Co., at Cole, Mont., 60 miles from Fort Peck dam site:



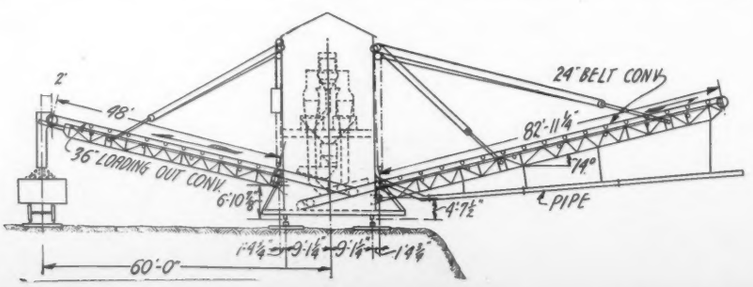


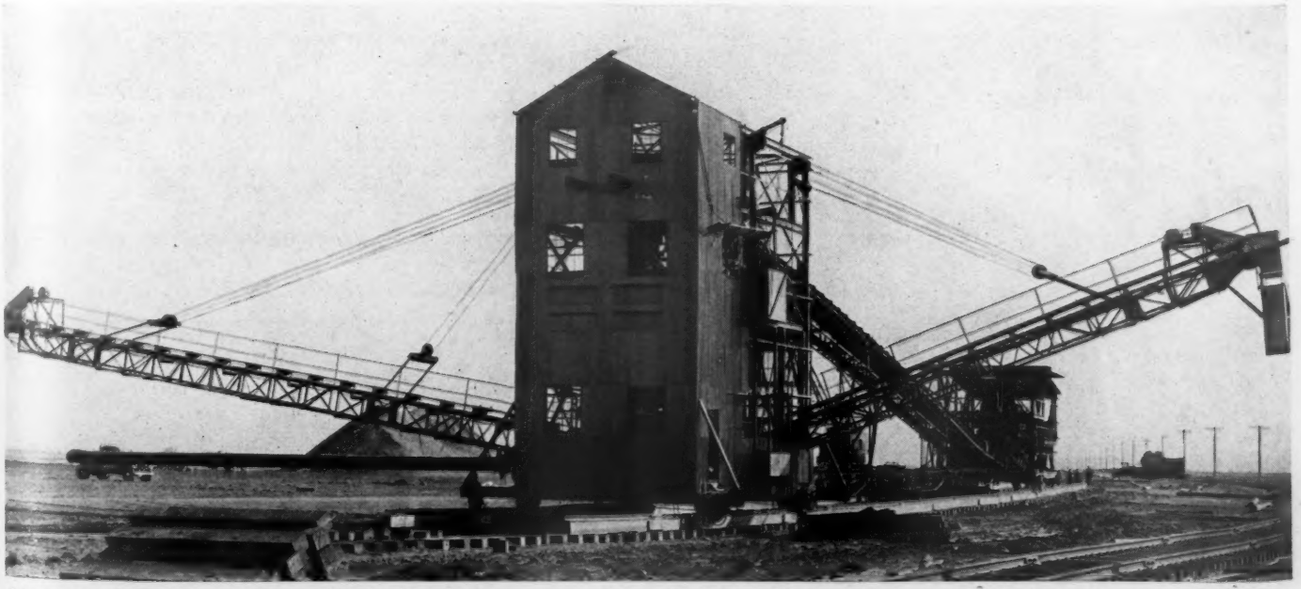
Diagram of portable track plant (see pictures and text on opposite page) supplying material for the government's Fort Peck dam project in Montana

Above: One of two portable crushing plants of F. S. Whiting, Kaysville, Utah

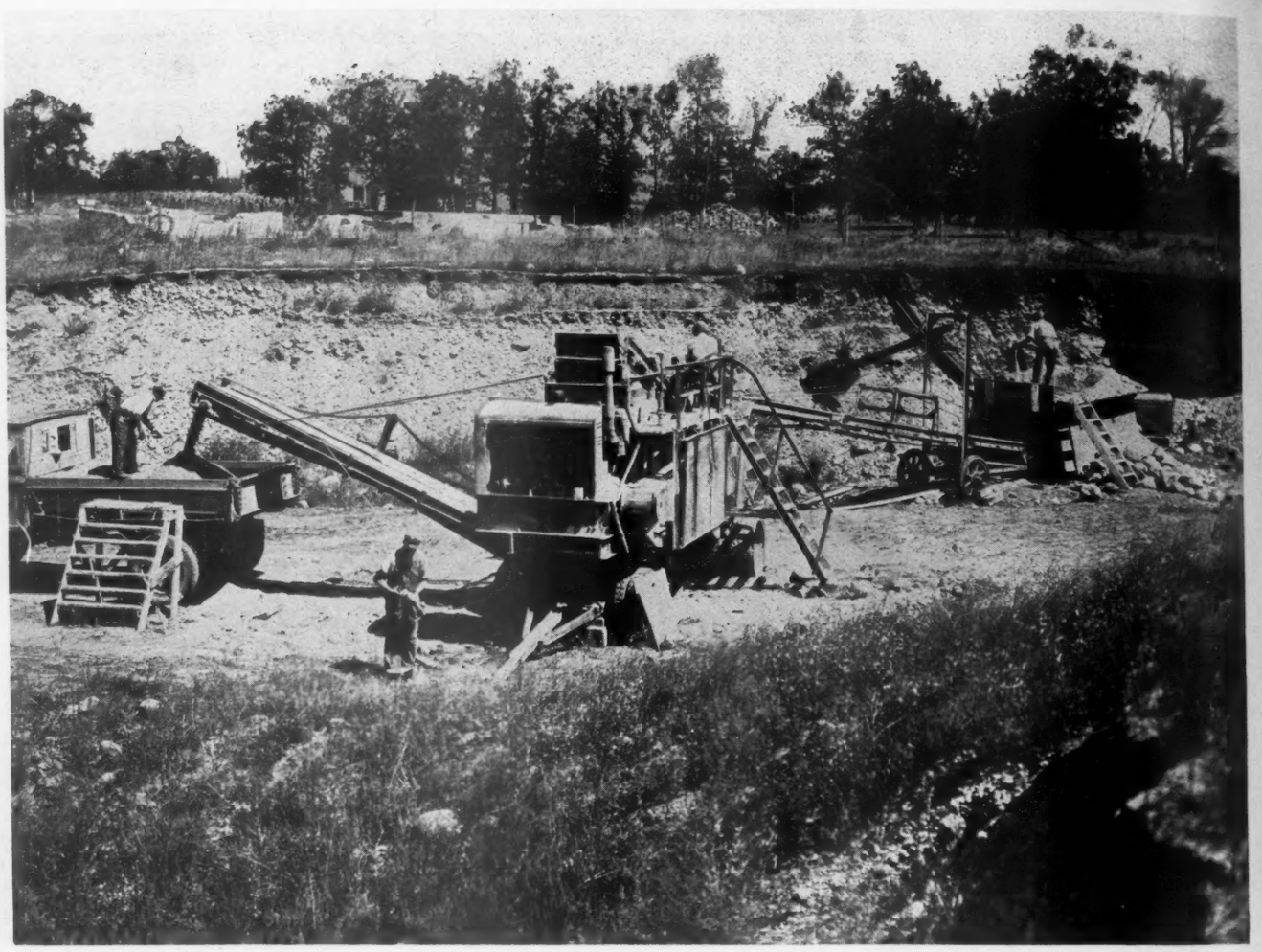
for Projects in Isolated Regions

Its output is supplemented by that of two portable plants operated by Becker County-Shiely Co.

Pictures on this page and the diagram in center of opposite page show how a commercial producer has drafted modern portable plant equipment for service in connection with stationary plant operation. Located at Cole, Mont., 60 miles from the Fort Peck dam site, the J. L. Shiely Co. built the permanent washing plant (now being enlarged) to furnish the first part of the 1,750,000-ton gravel contract awarded in connection with the Federal government's project at Fort Peck. With the Becker County Sand and Gravel Co., the J. L. Shiely Co. then organized the Becker County-Shiely Co. to operate the twin portable plant units (one of which is shown below) for fulfillment of the balance of the contract. Nearly a score of different specifications are being met for bridges, diversion tunnels, ballast and dam aggregates. Just as the town of Norris, Tenn., has been built in connection with the government's vast construction project, the town of Fort Peck also has been built. The plants supply aggregates for all the incidental building thus required



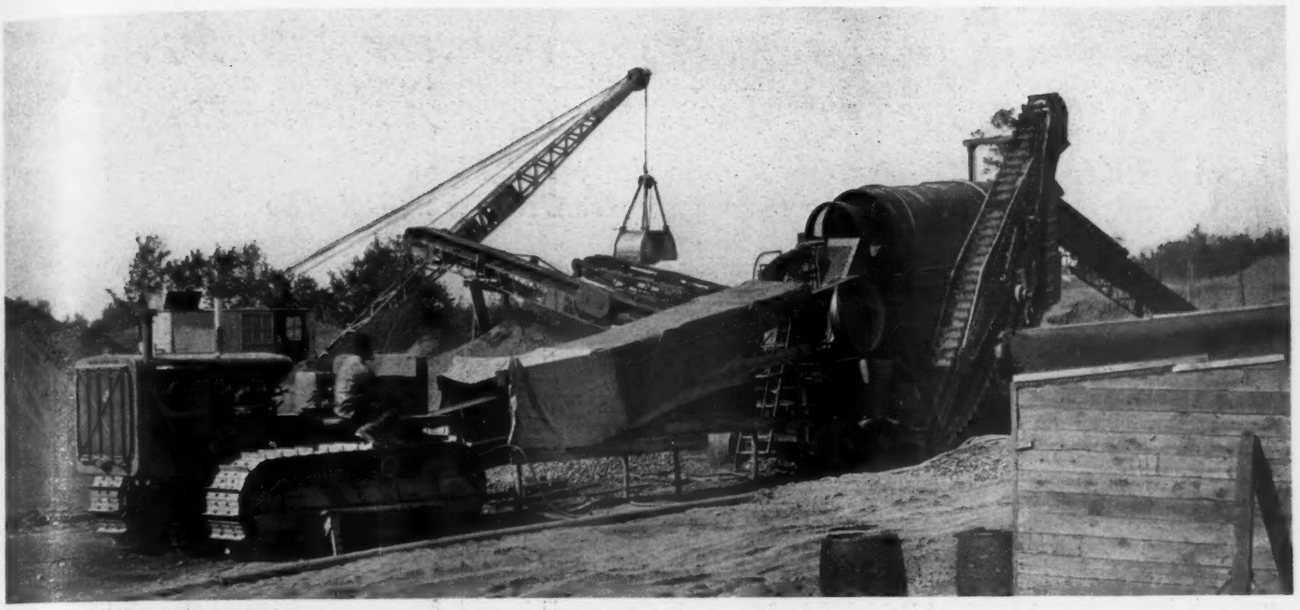
Above is shown one of two portable plants of Becker County-Shiely Co. at Cole, Mont. Operating under its own motive power over 21-ft. gage track, the plant (see diagram on opposite page) can load material directly into the gondola cars operated between Cole and Fort Peck. (The government-built railroad line has been established out of Saco, Mont.) Regular freight rate for the 60-mile haul between the plants and dam site would be 4½c per 100 lb., but the government has a special rate of three cents. For editorial discussion of portable plants and their use in combination with stationary plants by commercial producers, see Pages 62, 63 and 94. Additional illustrations bearing on portable equipment appear on the two following pages



Above is shown a representative portable plant operation in action at Portage, Wis. The shovel, crushing unit and truck equipment were operated by the Columbia County Highway Commission. Hundreds of similar projects were put under way during 1933 and 1934 by local authorities to provide relief work. In other cases (see illustration at top of opposite page) county authorities awarded relief work projects to independent operators of portable plants. A marked trend has developed, however, in another direction. Operators of commercial plants (such as the one shown below) have added portable units for service in isolated locations. About 10 portable and semi-portable sand, gravel and crushed stone plants thus are operated by the Brown-Rosenbarger Gravel Co., Indianapolis, Ind. They are used for short-period operations in Indiana and Michigan in cases where freight rates prohibit shipments from the regular commercial plants of two subsidiaries, the Acme Gravel & Construction Co., Indianapolis, and the Standard Materials Corp., Clinton, Ind.

The Acme plant shown below comprises three units. The largest plant (left) recently was built to turn out aggregates for state work. A scalping plant and auxiliary screening plant, for local work, also are shown. Some of the company's portable units are temporarily headquartered on commercial plant properties as work requires

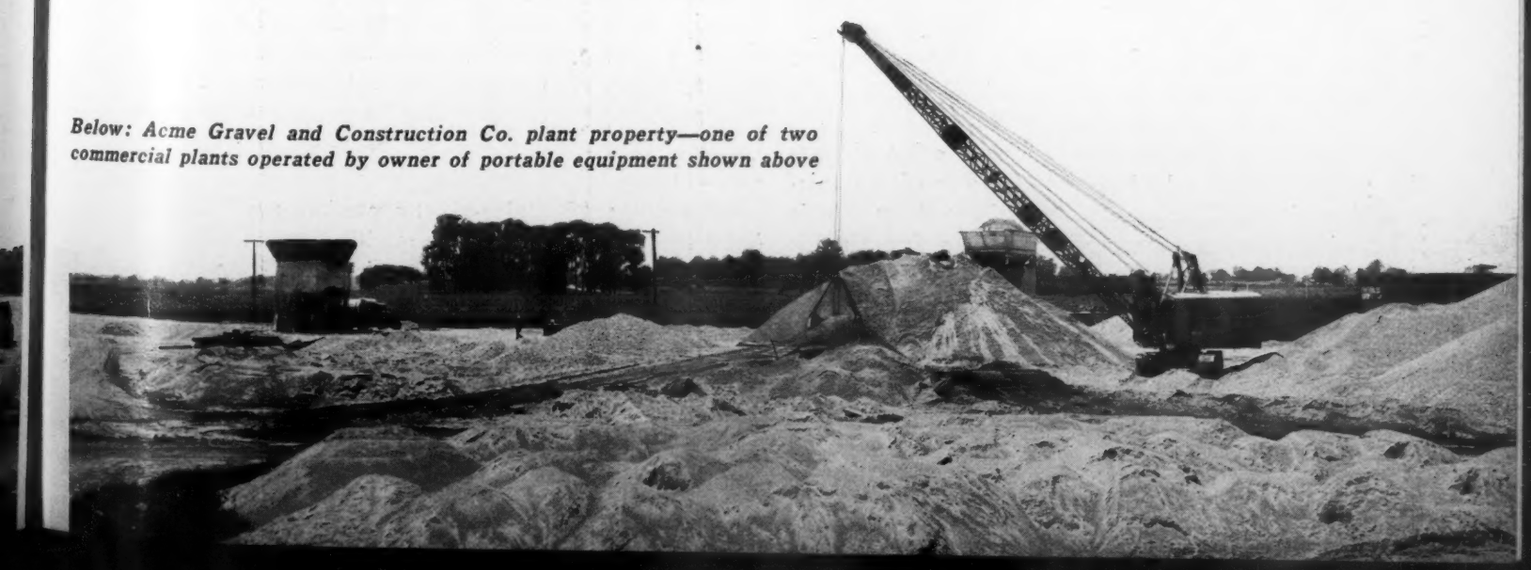
Below: Plant property of Acme Gravel and Construction Co., Indianapolis, Ind., operated by Brown-Rosenbarger Gravel Co., which also owns 10 portable plants as well as one additional commercial plant



Above: Tractor-operated screening, crushing and washing plant operated at Kimball, Wis., by Victor Nelson. (See top illustration on opposite page)

Left, above: A 28-ton dry screening outfit and 42-ton, 1¼-yd. crane unit of the Brown-Rosenbarger Gravel Co., Indianapolis, Ind., en route to Petoskey, Mich. Right: Plant in operation to supply highway materials. The last leg of the journey was made over a mile of one-way corduroy road through muck swampland. With turnouts provided every 500 ft., the tamarack and pine log road was just wide enough to give traction for truck. The two side wheels of the main unit, equipped with 14-in. solid tires were sturdy enough to carry the load the five hours required. The company operates two commercial plants as well as six portable or semi-portable crushing and washing plants and three portable dry-screening plants

Below: Acme Gravel and Construction Co. plant property—one of two commercial plants operated by owner of portable equipment shown above



Shall the Commercial Producer Meet New Competition With Portable Plants?

A Wide Difference of Opinion, But More and More Producers Are Operating Portables or Movables, and More Yet Are Considering Doing So

PRODUCERS of crushed stone, sand and gravel were asked specifically if they thought the operation of portable plants was a legitimate activity for the commercial producer, whether or not it was a temporary problem, whether or not they themselves were prospective or present portable plant operators, whether or not they thought the average contractor would rather buy than produce his aggregates, whether or not the right way to meet the competition of the contractor-producer was for the aggregates producer to become a road contractor.

Sand and Gravel: Just about half of the sand and gravel industry, if our returns are an accurate guide, now looks upon the operation of portable plants by commercial producers as a legitimate activity. These include some of the largest producers in the country. A considerable number of so-called fixed plant producers are already operating one or more portables in addition.

The other half of the industry either hasn't had any experience with portable plant competition, or is against it, regardless. The latter constitute only about 15% of those answering the questionnaire. No reasons are advanced for this animosity toward portable plants except that they are a waste where there is an over-capacity in established plants, and that this competition is generally unfair to the established producer. Granting these to be true, of course, is not going to prevent some one from operating a portable plant if he can produce and place on the job a passable product for less money than the established producer. The problem is one of business and economics and not one of sentiment. The returns show that the majority of producers now fully appreciate this.

Comments by Sand and Gravel Producers

Virginia: "We believe the portable plant is legitimate and here to stay. Through this section there are only a few contractor-producer outfits. We are strongly of the opinion a man should be a producer or a contractor and not both. We find it is only the selfish contractor who is not willing to 'live and let live,' who attempts to produce his own aggregates. Nor would we like to see the producer go into contracting on secondary roads. The best way to meet this kind of competition is by the joint operation of established and portable plants."

Utah: "In the Western States the operation of portable plants could well be legitimate business of the commercial producer. More and more business every year is being taken from the commercial producer through this channel. There are so few commercial plants that it is much more satisfactory to produce on or near the job site than to ship great distances by rail; cheaper too. We have given much thought to the problem. In this territory there are many contractors successfully operating their own plants and placing materials on the road, carrying the entire contract. It is our belief that some of the commercial producers will have to enter the portable field and probably the contracting field to compete. It is impossible here to compete with portable operators by shipping from established plants."

Illinois: "Portable plants are economically sound under certain conditions, and although we are permanent plant operators we can see a place for these plants that is not in direct conflict with a fixed plant. They should be operated by private enterprise and under full code regulations as required of commercial producers."

California: "I went into the semi-portable plant game because it was apparent three years ago that my permanent plant business was going to shrink for an indefinite period. My big competitors had threatened to do this and I simply figured I would beat them to it. This portable plant business has come to stay because it is economically advantageous to the public. The average contractor would rather buy from my semi-portable plant until he finds out that I am making a fair profit; then he begins to try to chisel. Producers can not successfully become road contractors, and if they try they will simply make a bad matter worse, for the contractor field is too crowded now. We can not get this business back by shipping from permanent plants without increasing costs outrageously."

Kansas: "The FERA has opened the way for a new means of production and particularly in the state of Kansas many established producers will be forced to operate portable plants. In the western two-thirds of the state the contractor would rather produce than buy. The established producer to meet successfully this contractor-producer competition will sooner or later have to create his own market, which will naturally force him into the contracting business. A project will sometimes permit shipping of material, but to be protected 100% the established producer must be equipped for portable production."

Ohio: "The portable plant is legitimate and the only salvation of the commercial producer from FERA competition. Probably present producers are more seriously considering portables as logical equipment. I doubt the advisability of many producers turning contractor. We are contractors who turned producer. Why—the Almighty no doubt knows!"

Oklahoma: "Portable plant operations are legitimate but I think are a temporary proposition, and will be good only so long as cheap trucking prices and other factors favorable to portable production are maintained. The average *successful* contractor would rather buy from an established plant, if prices are anywhere near in line. I firmly believe the established producers can and should put

the materials on the road where the activities of portable plant producers would otherwise prevent him from keeping the market. They can meet this competition by using both established plants and by operating such portable plants as will figure to be profitable, making both ventures stand on their own merits."

Minnesota: "The portable plant enables a substantial saving in freight charges and is here to stay, particularly for secondary road work. We operate one portable and four permanent plants. The majority of road contractors who have had experience producing their own aggregates would rather buy from producers than produce. Naturally, the next step, as a matter of fact one which is becoming common, is for the aggregate producer to take over the duties of contractor in disposing of the finished product upon the road. As long as specifications are not literally adhered to, established commercial plants can not compete with portables where the freight rate is 50c or more per ton from commercial plants. About 26% of the permanent plant operators in this territory have one or more portable plants, which they move around. Except in rare instances it would be better for the taxpayer, the agency in charge of the project, the contractor and society in general, if materials were shipped from established plants. Generally speaking, the saving which may be made by the portable plant goes to some individual; some is reflected in the job, but the job suffers from an inferior quality of product; and business generally is disturbed by the breaking up of its normal cycle."

Massachusetts: "The operation of portable plants for the production of aggregates is a legitimate activity of the commercial producer. If he wishes to enter this field in competition with the contractor-producer, who merely charges his job with the bare bones cost of producing the aggregate, this naturally does not leave any margin of profit for the commercial producer. In Massachusetts, 85% of the concrete aggregate used on state highway jobs has been produced from portable plants owned and operated by the highway contractor. This condition has existed for a good many years and will be a permanent condition, as far as Massachusetts is concerned. There are a comparatively small number of commercial plants capable of giving adequate service to a large road job. Therefore, the road contractor is practically obliged to produce his own aggregates. There are small deposits of good material located pretty generally all over the state. Only a small proportion of the products of our industries in Massachusetts is shipped by rail. It is practically all delivered by truck over the road. With regard to the advisability of the aggregate producer becoming a road contractor, it will have to be determined to what extent such procedure might force the road contractor to become a commercial producer of aggregates. There is no definite general conclusion which can be arrived at."

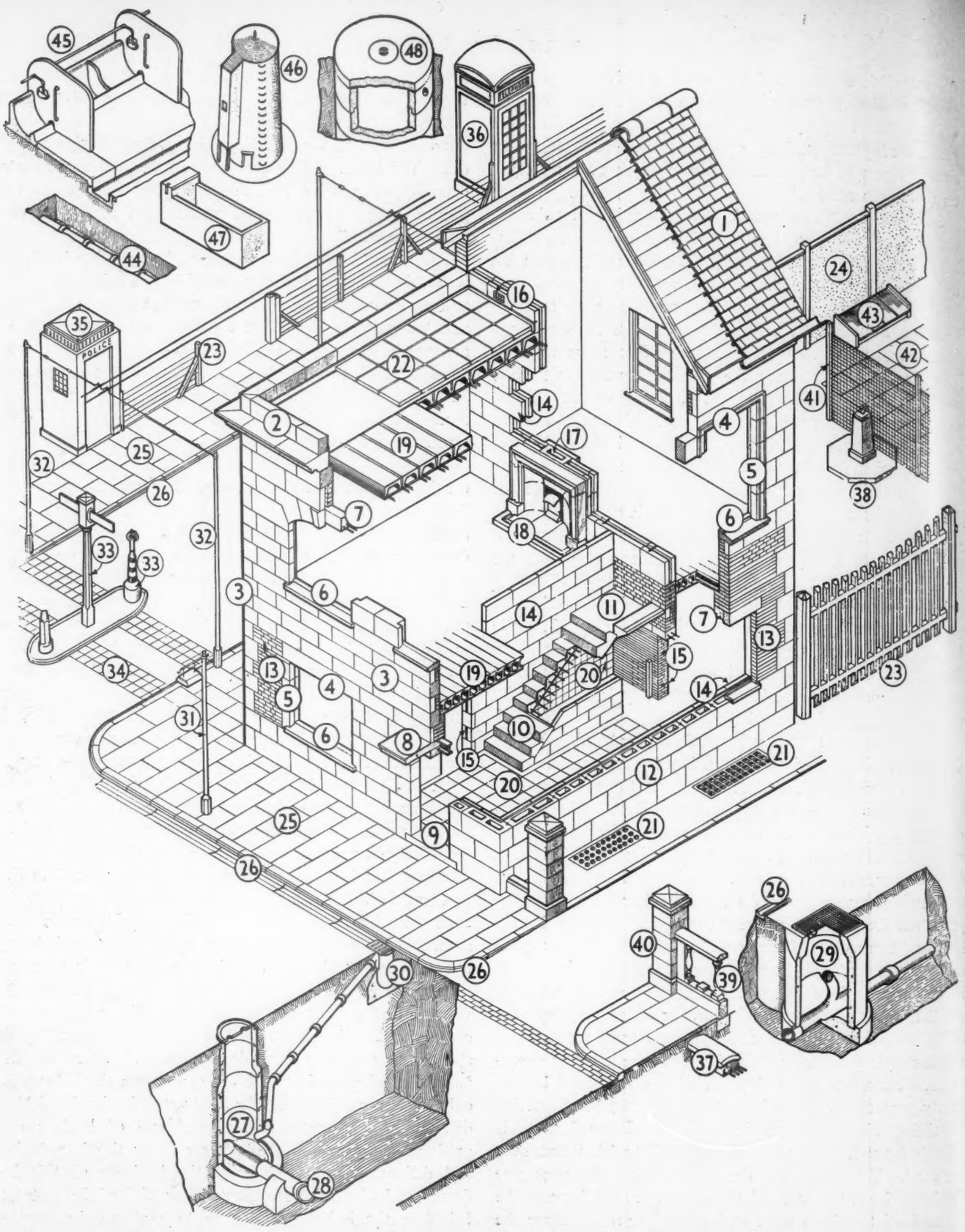
Ohio: "High freight rates, increase of trucking radius and imposition of prohibitive wage scales have made the established commercial plant of the past obsolete, and the small portable plant will probably be the answer. Increasing use of portable plants will probably put the gravel producer in the contracting business. Some are already launched in that field. We feel that the gravel business is undergoing a definite permanent evolution in methods of operation and as a result large units of production will go out. The industry is bound to break down into a greater diversity of smaller and more flexible units, combining production of material with construction into which the material enters."

Illinois: "We believe portable plant production legitimate. The increase in the use of such equipment started and grew rapidly long before the present era of relief labor and 'no cost' projects, but this was not apparent to all producers. The present high level of freight rates has been an influential factor. Where the railway managements have 'seen the light' and have made temporary reductions to meet motor-truck competition, such business has been saved the permanent plant operator and the railroad. We do not operate a portable plant at present but have seriously considered it on several occasions. The present commercial fixed plant producer can meet this competition by a combination of all factors. He can not meet competitive production by FERA or governmental units so long as the political authorities concerned disregard all factors of cost and are motivated in building up an organization that will provide soft berths for friends and vote-getters."

Missouri: "If we are to continue with a large program of road construction of the lower types, where surfacing material is to be used, then an increase in percentage of this will be produced by portable or semi-portable plants, and it is entirely a legitimate enterprise for the established producer. While my company has figured on several projects based on use of this kind of equipment, the general shortage of business in the industry has resulted in such prices that we have not been successful as bidders. The first six projects we bid on about a year ago, all of them resulted in losses to the successful bidder and in five of them, I think the bonding company had to complete the work. So far the question of FERA relief labor does not seem to have entered into this competition. Our industry can not expect to hold business for stationary plants where such materials can be more cheaply produced locally, providing all the costs are considered. The average road contractor building concrete or permanent types of roads appears to prefer to buy his aggregates. There has developed a substantial volume of road contracting where the only service rendered by the contractor is the furnishing delivery of aggregates and a minimum of blading and grade maintenance. It seems to me the work of producing and delivering our products is the business of this industry, and where this represents 90 or 95% of the contract, I believe the industry will have to perform the service, even though we are classed as contractors by so doing. The competition between shipping secondary road material and producing it locally is one of competitive costs for each product and the method of production can not be determined on any basis except that of cost."

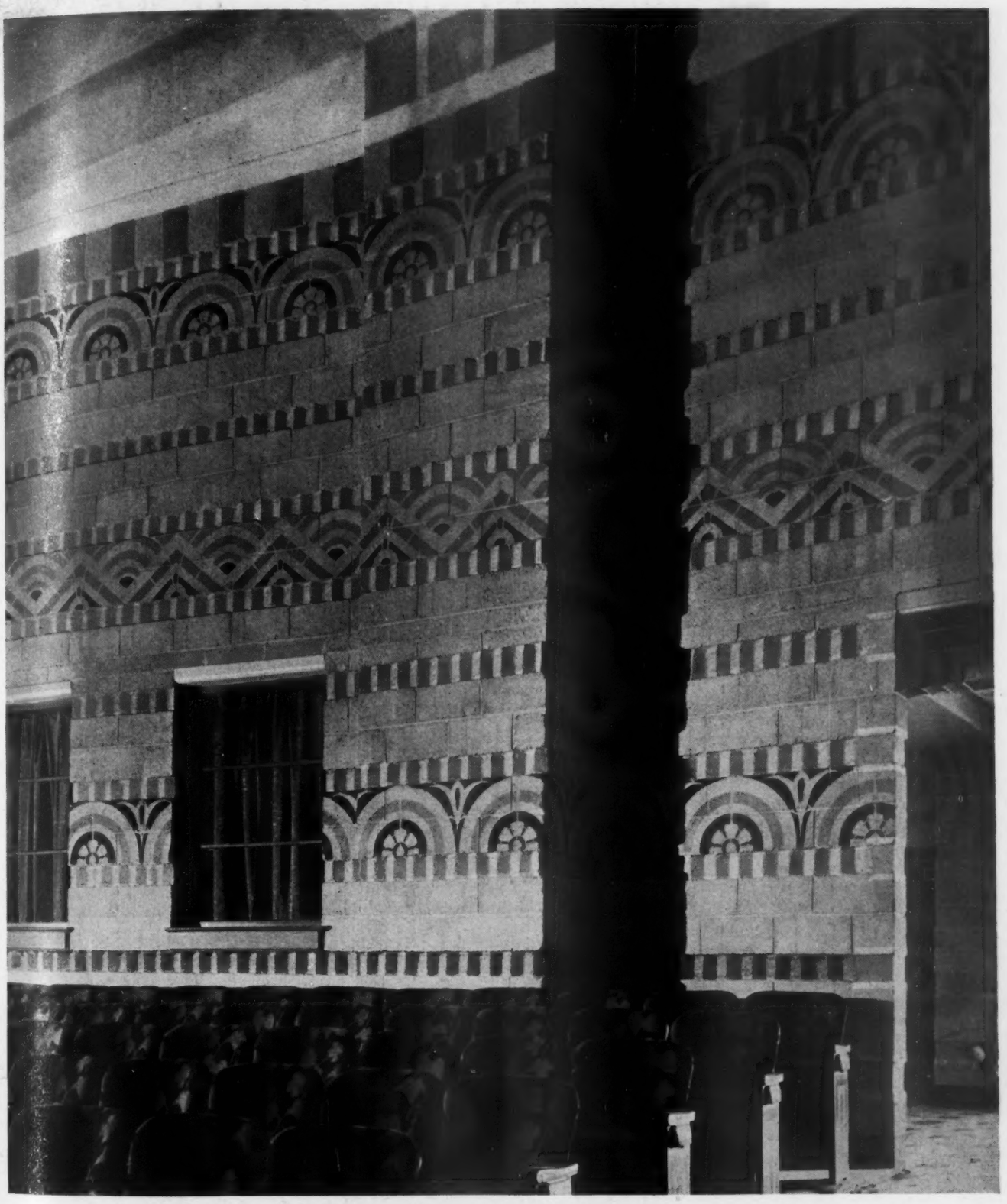
Wisconsin: "Have two fixed plants and one quarry. Bought a semi-portable plant in 1934, would like one more.

(*Continued on page* 94)



The Cast Concrete Products Association of England has outlined the multiple outlets for concrete products in modern building by publishing the diagram reproduced above. It is significant further in showing the parallel outlet for cement, crushed stone, sand and gravel, and slag that go to make up the great variety of cement products noted. Key to illustrations: 1—Roofing tiles. 2—Cast stone blocking course and cornice. 3—Quoins and ashlar. 4—Heads. 5—Jambs. 6—Sills. 7—Lintels. 8—Doorhoods. 9—Steps. 10—Staircases. 11—Landings. 12—Wall blocks. 13—Bricks. 14—Partition slabs. 15—Fixing bricks. 16—Air bricks. 17—Gas flue blocks. 18—Cast stone fireplaces. 19—Floors, precast. 20—Floor and wall tiles. 21—Pavement lights. 22—Insulating roof slabs. 23—Fencing and gate posts. 24—Pier and panel fencing. 25—Flags. 26—Curbs and channels. 27—Manholes. 28—Pipes. 29—Inspection chambers. 30—Gulleys, road. 31—Lamp standards. 32—Poles for overhead lines. 33—Road sign posts. 34—Pedestrian crossings. 35—Police boxes. 36—Telephone boxes. 37—Cable covers. 38—Garden ornaments. 39—Balustrading. 40—Gate piers. 41—Tennis court surround posts. 42—Slabs, tennis court. 43—Garden frames. 44—Land drainage pipes. 45 and 46—Stalls and silos (for country home sites). 47—Tanks and troughs. 48—Well tubes

STRIKING EFFECT WITH ASHLAR IN THEATRE



Another theatre in the Detroit area has been built with concrete ashlar units. Interior of the Tower moving picture theatre, shown above, was designed by Architect Arthur K. Hyde. Its feature is use of saw-tooth units laid up alternately with standard size 8x8x16" units. Made of coarse aggregate and cement, and furnished by the Standard Building Products Co., of Detroit, the ashlar units are praised by the theatre management for their acoustical effect, as well as appearance. The theatre has a seating capacity of 1,500. Ashlar is a major 1935 trend in the concrete products and building field

A Typical Eastern Lime Plant—

G. & W. H. Corson, Plymouth Meeting, Pennsylvania, founded the business, plant of which is shown here, in 1822. It has been a going concern ever since.

* * *

The lime industry was the first rock products industry to have its Code approved. It has prospered under NRA and most of its members are fairly well satisfied. It is the only rock products industry that got started on the upgrade in 1933—and continued onward in 1934.

* * *

This oldest rock products industry has learned much during the depression and took advantage of it to organize for profitable operation when business returns—and business started returning as a result.

Wood Aerial Surveys Photograph

A MAJOR 1934 development in the cement manufacturing industry—Commercial application of flotation machinery, adapted from ore refining, for the separation of the mineral ingredients of portland cement slurry—its use and functions are illustrated on the four succeeding pages. Valley Forge Cement Co. (Details described in Rock Products, August, 1934.)

TYPICAL ARGILLACEOUS LIMESTONE

Photomicrographs of Thin Sections

SPECIMENS illustrated on this page demonstrate that the principal mineral constituents of argillaceous limestones or "cement rocks," in their natural state, are uncombined and that they exist in a wide range of sizes as distinct mineral compounds. They were also chosen to illustrate the wide variation in the natural physical structures of these rocks and their component minerals.

In these and in the illustrations of ground specimens, shown in the following pages, the principal mineral constituents are: carbonate (principally calcite); quartz; silicates of alumina (principally mica, common muscovite and sericite; limonite (hydrous iron oxide); pyrite; carbon (principally amorphous); apatite; cryptocrystalline or amorphous silica; and dusts of these various minerals.

The compounds were identified by polarized light with crossed Nicol prisms and gypsum slide, and in some cases with the aid of index solutions. In coloring the plates the natural color of yellow was used to identify calcite and blue for quartz. Alumina bodies were arbitrarily colored green (in some instances partially outlined by yellow) and iron red. Compare the particles with the micron scale drawn on each illustration to indicate the degree of magnification. Each of the thin sections was cut substantially perpendicular to plane of cleavage; the view is in a line parallel to the cleavage plane.

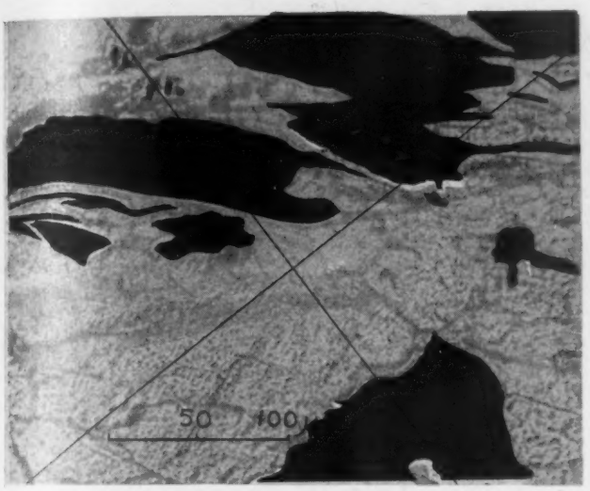


Fig. 1. Valley Forge cement rock, believed to be a metamorphosed micaceous limestone of approximately the same geological age as Lehigh Valley cement rock. The calcite (yellow) is medium to fine grained. The alumina bodies are present as relatively large flakes of muscovite between which are thicker layers of carbonate minerals, together with quartz grains (blue). Note the large quartz particle at the lower right, the iron (red) and the distribution of each of the minerals. The analysis of this specimen is: SiO_2-15.56; Fe_2O_3-1.69; Al_2O_3-6.13; CaO-39.53

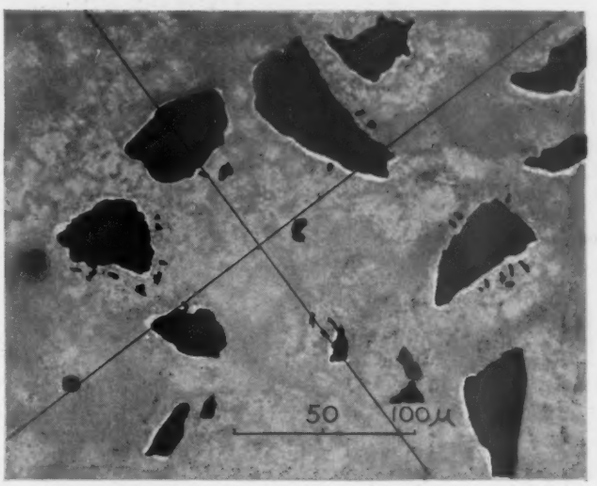


Fig. 2. This specimen of middle-western sand-limestone cannot properly be described as a cement rock, although it is used for cement manufacture. The distribution of the quartz particles should especially be noted, and their large size compared with the micron scale. The carbonate particles are extremely fine-grained, their natural sizes being only a few microns or less in diameter. The cloudy appearance is due to this extremely fine structure and the possible presence of extremely fine grains of clay minerals. Note the encroachment of carbonate and micaceous particles, particularly on the quartz grain at the left center. The analysis of this specimen is as follows: SiO_2-27.66; Fe_2O_3-0.29; Al_2O_3-2.59; CaO-38.19

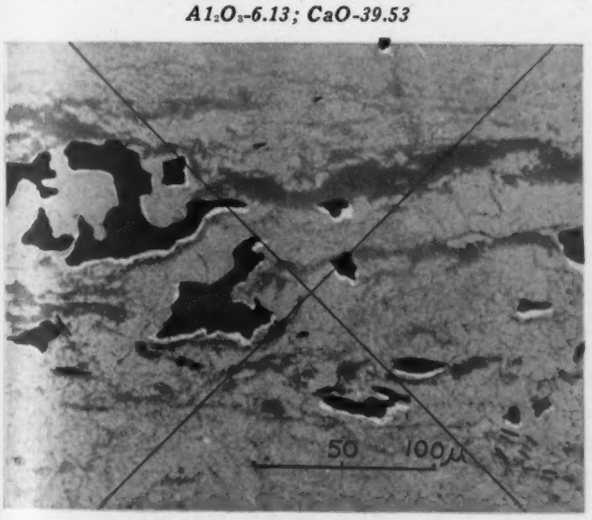


Fig. 3. Cement rock from the Evansville quarry of the Allentown Portland Cement Co. Calcite, quartz and sericite make up the mass of this fine-grained, low-alumina limestone. The dark, uncolored matter is amorphous carbon. The quartz is localized in the coarser-grained bands, making the physical bonds easily broken

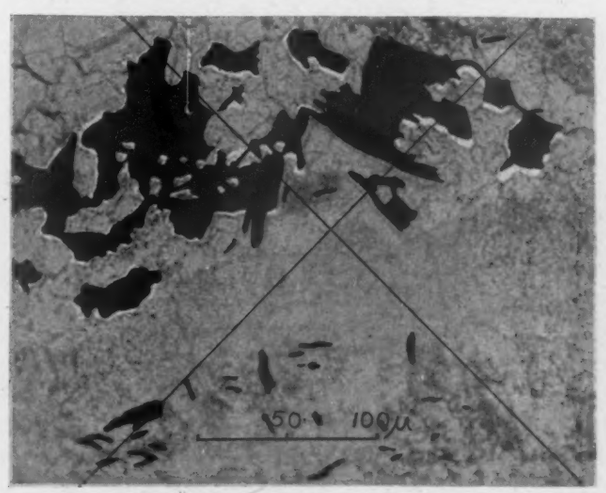
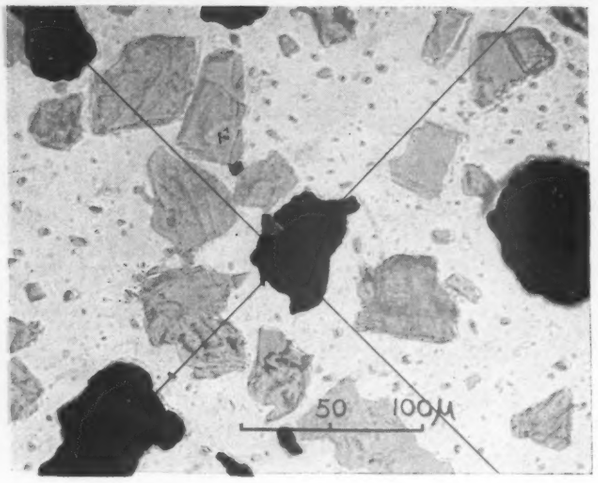


Fig. 4. A specimen of Lehigh Valley cement rock, or "blue-stone." The principal constituents are calcite, quartz and muscovite. These minerals are partially recrystallized, as will be seen by contrasting the coarser-grained minerals in the right-hand corner with the finer-grained, more carbonaceous original rock material at the bottom. Here, too, as in Fig. 3, most of the quartz is fortunately localized in the coarser bands.



The illustrations on this page show untreated and treated ground specimens from original materials substantially identical to the rock shown in thin section in Fig. 1. Fig. 5 is the original material as it appears after particle-size classification, but before treatment by froth flotation. This is commonly referred to as a "head" sample. Fig. 6 is a flotation concentrate, principally calcite, and Fig. 7 is a specimen of the rejects (waste products of the flotation cells). These are usually referred to as "tails"

Fig. 5. Head sample after particle-size classification but before processing. Some particles have been retained to make up sufficient tonnage, whereby the analysis of the finished product will be corrected by the elimination of quartz and a part of the alumina. The approximate analysis is: SiO_2-15.56; Fe_2O_3-1.69; Al_2O_3-6.13; CaO-39.53

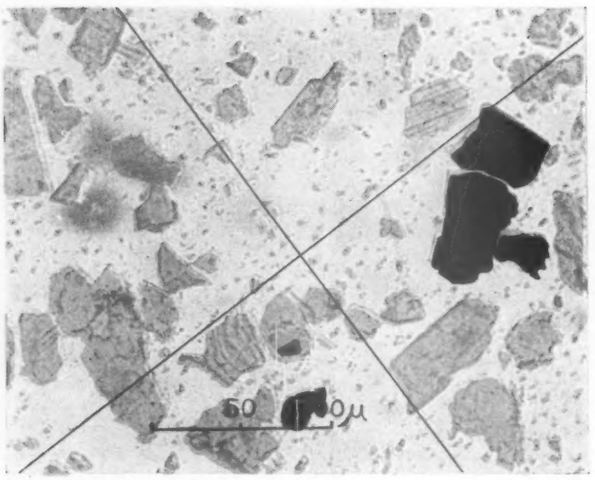


Fig. 6. The flotation concentrates. This product is chiefly calcite. Two alumina and two quartz particles are present, indicating incomplete cleaning of the froth. An additional flotation stage would not be necessary in view of the small percentage of these minerals present. The iron granule trapped in the calcite particle shown in the lower center would be released by finer grinding. The approximate analysis is: SiO_2-3.82; Fe_2O_3-1.22; Al_2O_3-2.52; CaO-47.98

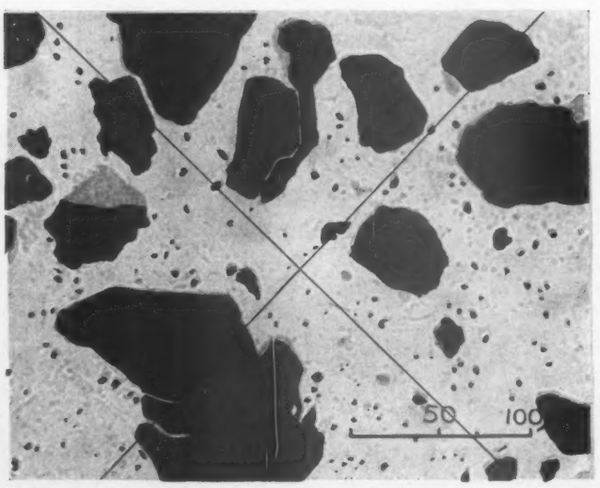


Fig. 7. The rejects are almost entirely quartz and mica. The reasons why some calcite is lost with the rejects will be apparent from the particle at the left center. It will be seen that the physical bond between the carbonate and the quartz was not broken by grinding. In the treatment of this rock, however, grinding to normal fineness would cost much more than the value of the lost calcite. The approximate analysis is: SiO_2-57.76; Fe_2O_3-1.04; Al_2O_3-20.42; CaO-6.23

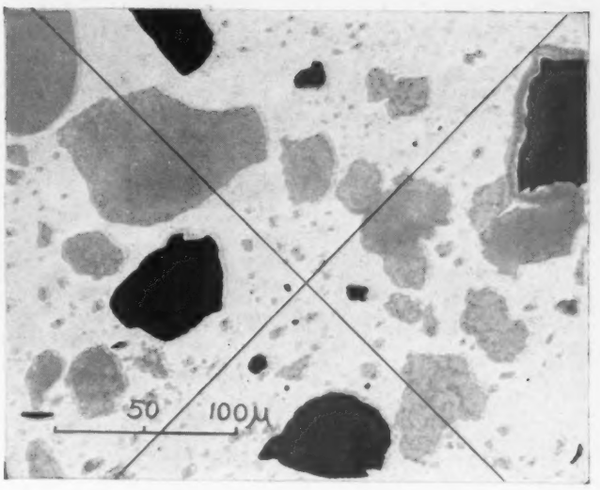


Fig. 8. A sample of ground sand-limestone prior to separation by froth flotation. The carbonate particles are not large grains as they might appear, but aggregates of tens or hundreds of small grains only a few microns in diameter. The cloudy appearance is due to the internal reflection of these fine particles and possibly to a minute quantity of clay minerals or iron stain. The condition of the quartz particles is of especial interest, not only with respect to their large size, but also to the fact that they exist in two types; those having sharp outlines and the particles shown in the upper right-hand corner, the surface of which is outlined by calcite particles firmly attached to it. This coating if complete would probably cause this particle to be recovered with the froth and contaminate the concentrate, but further grinding would result in the elimination of this particle. The approximate analysis is: SiO_2-27.66; Fe_2C_3-0.29; Al_2O_3-2.59; CaO-38.19

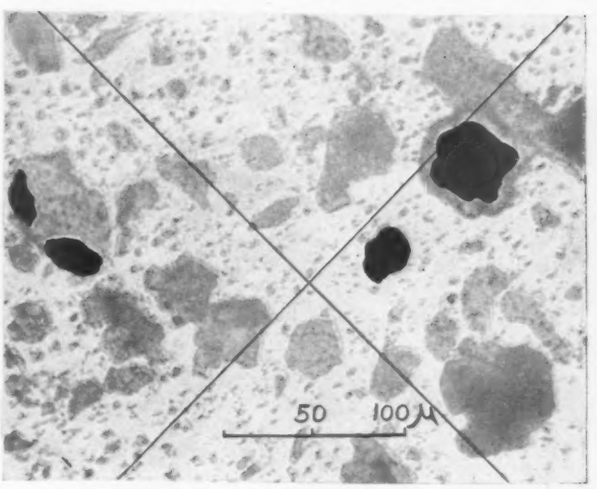


Fig. 9. A very pure calcite concentrate can be derived from this specimen with moderate preliminary grinding. The quartz particle shown in the upper right is similar to that described above, and was floated because the collecting or coating agent reacted upon the carbonate grains attached to its surface. It will be seen that the two remaining quartz particles were surrounded or imbedded in a larger calcite particle, the surface area of which was so great that the lifting effect of the frothing agent caused the entire particle to be recovered. In view of the relatively high purity of this concentrate, it will be evident that finer grinding to free the physical bonds between these calcite and quartz particles would not be warranted, as it is an objective of the process to economize in raw grinding costs, and the average particle size of the entrapped quartz is such that the kiln reactions would be favorable. The approximate analysis is: SiO_2-6.10; Fe_2O_3-0.92; Al_2O_3-2.38; CaO-50.85

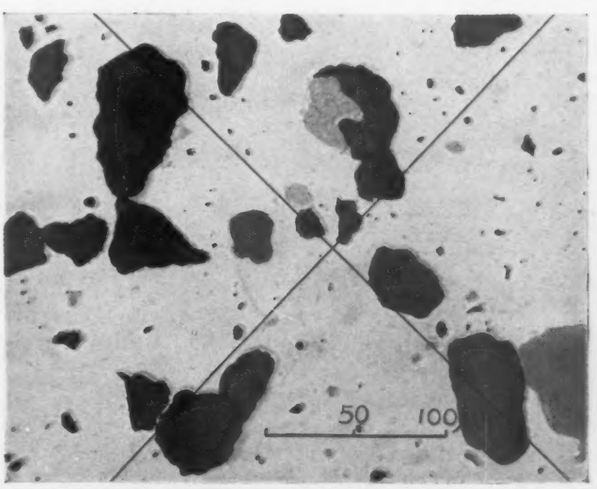


Fig. 10. The rejects contain numerous quartz grains and some flakes of mica. The small quantity of carbonate grains were deposited with the rejects principally because they are impure, often containing considerable disseminated clayey material. This specimen clearly illustrates the opposite reaction due to the incomplete breakage of the physical bond between calcite and quartz, as a result of which some additional calcite is present in the rejects. Note particularly the particle in the upper center in which a smaller volume of calcite is embedded and partially surrounded by quartz. Here too, the calcite could have been saved by further grinding, but it will be realized that in many cases the power savings in raw grinding are worth more than the material wasted. In each of these specimens it should be borne in mind that the percentage of calcite loss is a relatively small percentage of the rejects and the rejects themselves are a minor portion of the total raw material tonnage. The analysis of this specimen is: SiO_2-74.64; Fe_2O_3-2.66; Al_2O_3-3.62; CaO-9.37

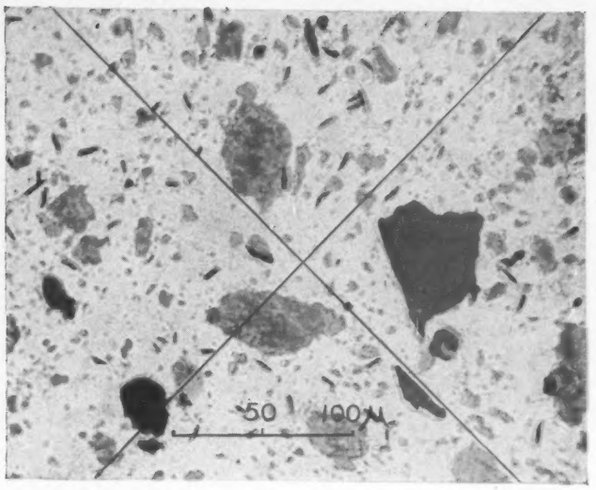


Fig. 11. This ground specimen of Lehigh Valley cement rock does not correspond to any of those shown in thin section, but was chosen to illustrate that each of the constituent minerals may range in natural particle sizes from one or two microns to relatively coarse grains. The alumina occurs as fine shreds of sericite, whereas the quartz is present in both small and large grains. The large particle at the lower left is apatite. This unusual material responded successfully to froth flotation after fine grinding released the various constituent minerals from each other. The approximate analysis is: SiO_2-17.46; Fe_2O_3-2.41; Al_2O_3-6.8; CaO-37.56

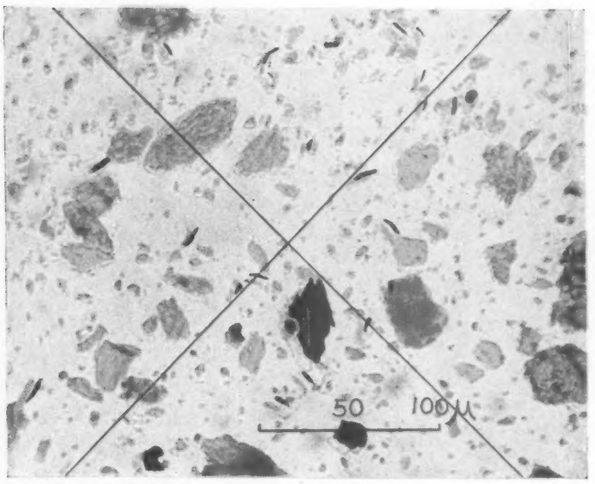


Fig. 12. The concentrates are principally calcite and the few quartz grains are present primarily due to the fact that these fine particles were trapped by the froth and in some instances not completely released physically. The extremely small size of the sericite shreds caused them to adhere to the larger grains or to the froth. Accordingly, in normal treatment, the concentrate is contaminated by these fine particles, but their presence is not harmful and it is unnecessary to clean the concentrate, for as will be seen from the micron scale there is no danger of incomplete reaction in the kiln due to particle-size segregation. The approximate analysis is: SiO_2-9.30; Fe_2O_3-1.61; Al_2O_3-3.81; CaO-45.10

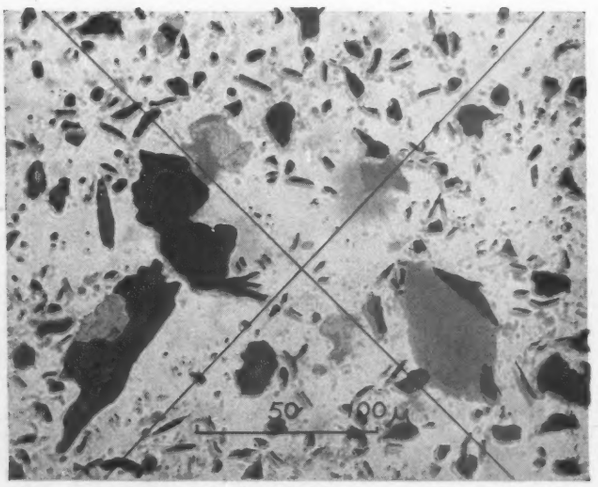
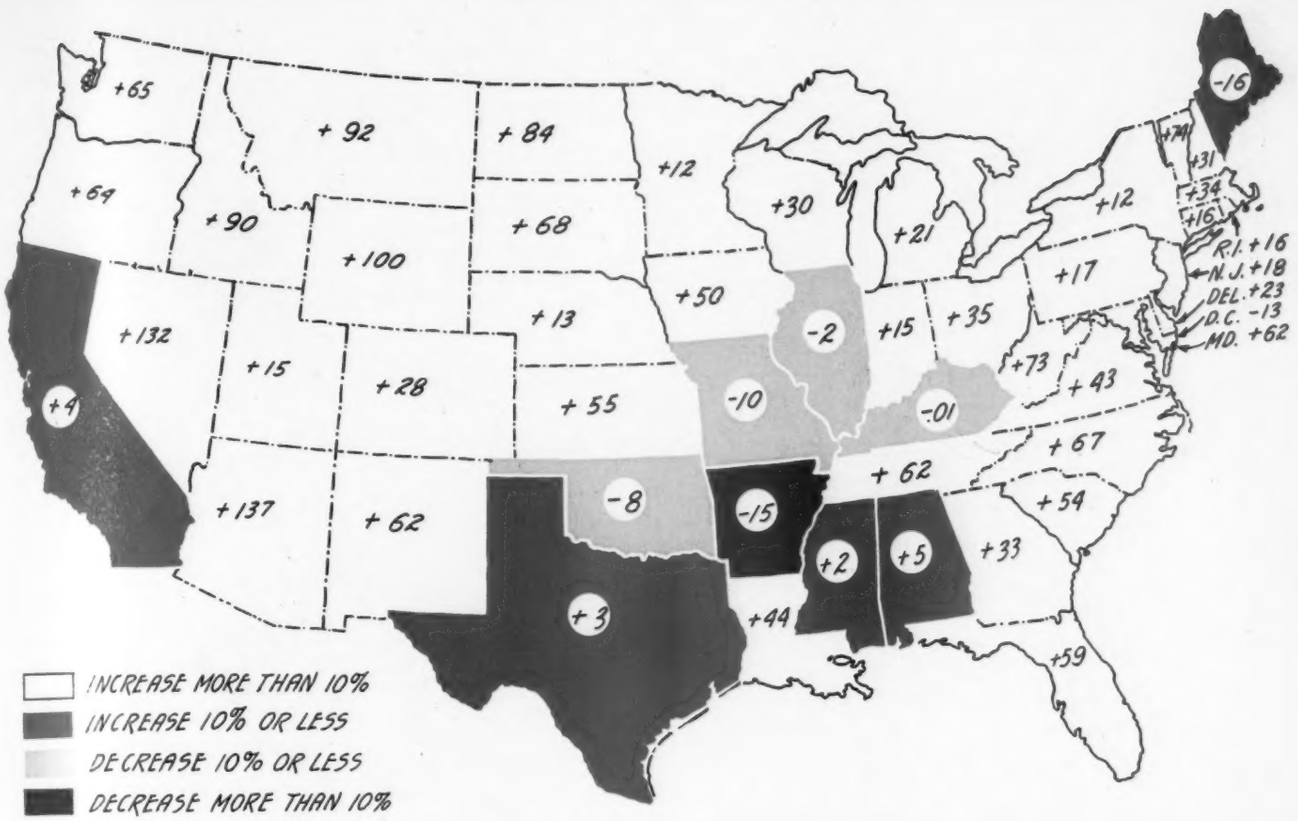
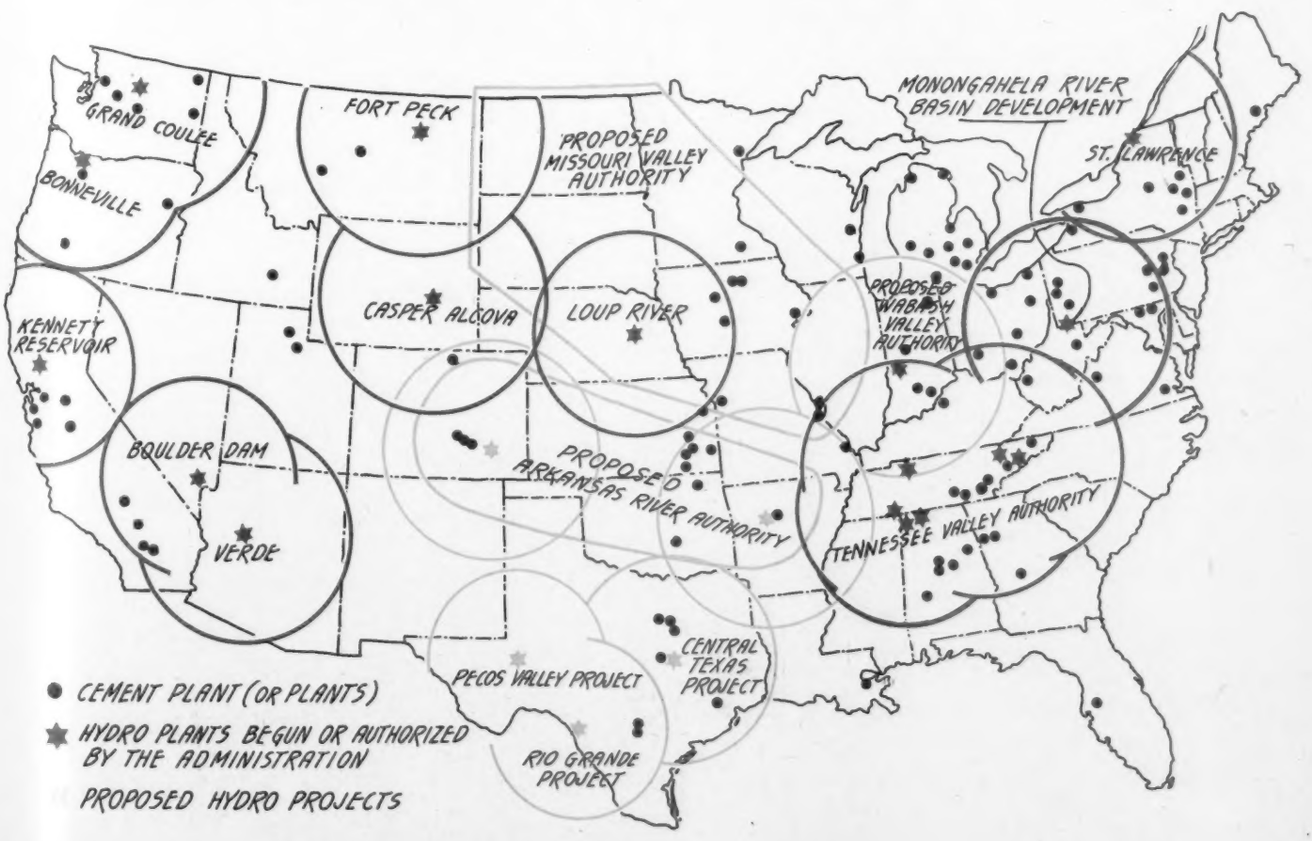
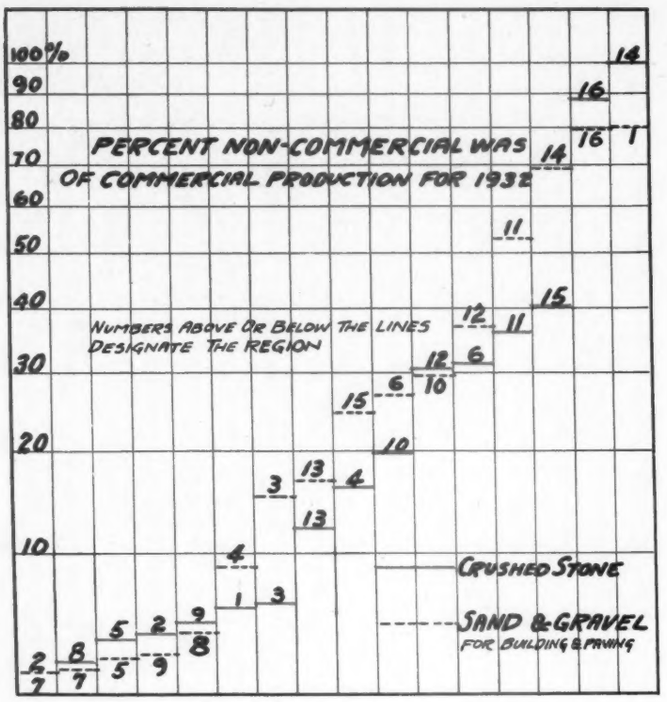


Fig. 13. The rejects from this specimen are probably a better indicator of the results obtainable than the concentrates. These contain quartz, sericite (indicated by green outlined by yellow; the yellow on these particles is not calcite but is due to imperfect registration), and an occasional flake of muscovite, carbonaceous matter, iron oxide, apatite, and a few particles of carbonate. Several carbonate particles will be seen imbedded in or attached to quartz. The large calcite particle on the upper left cross-hair was contaminated by clay inclusions, which tend to carry the entire particle to the rejects. The large particle at the right is graphite, probably deposited upon a particle of quartz. The analysis of the rejects is approximately: SiO_2-56.38; Fe_2O_3-3.35; Al_2O_3-15.07; CaO-7.43



Above: ***Shipments of portland cement into states for the 11 months ending in November, 1934, as compared with shipments in the same period of 1933. (Bureau of Mines percentages.) Below: Location of cement plants shown in connection with locations of government hydroelectric and river development projects.***



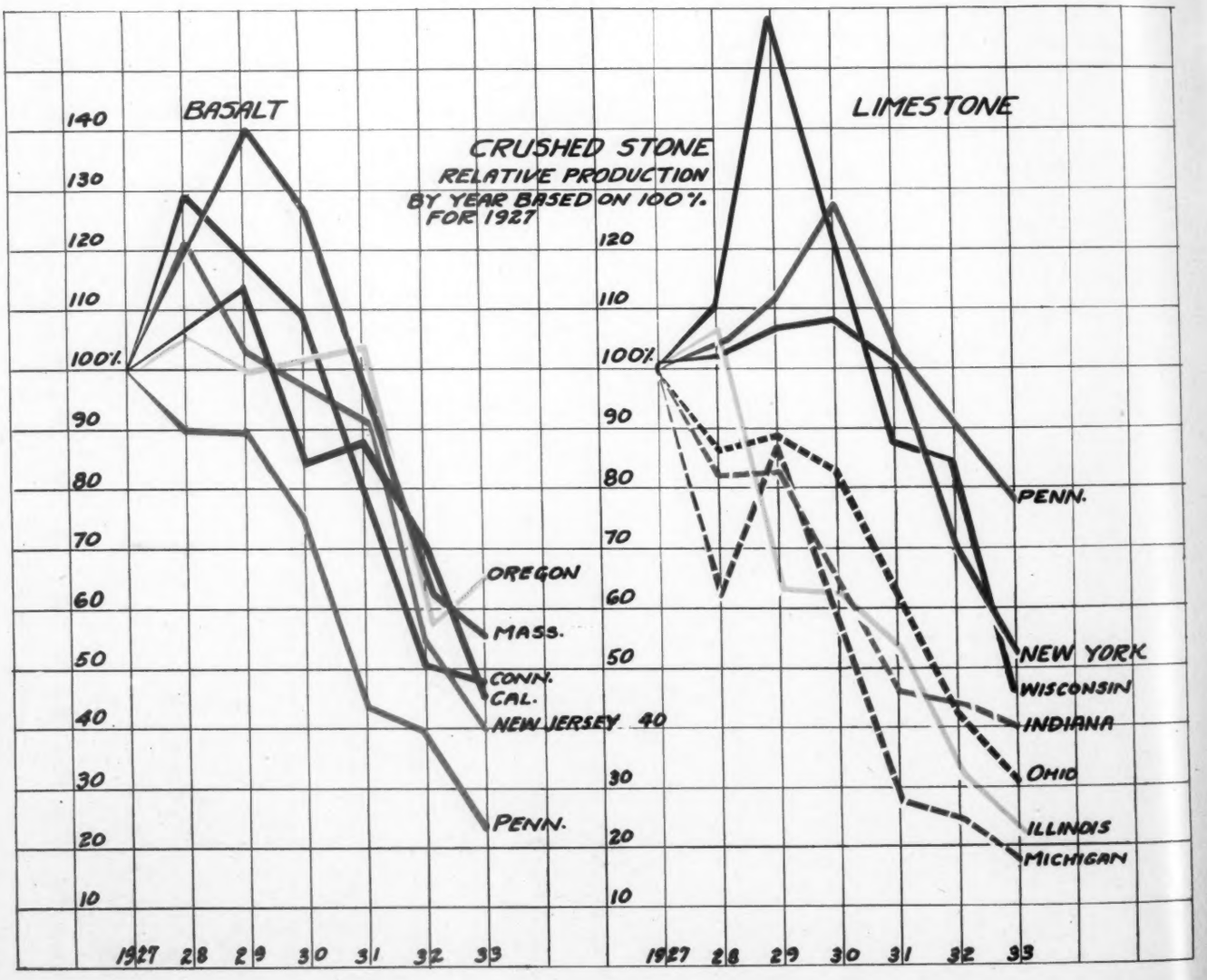


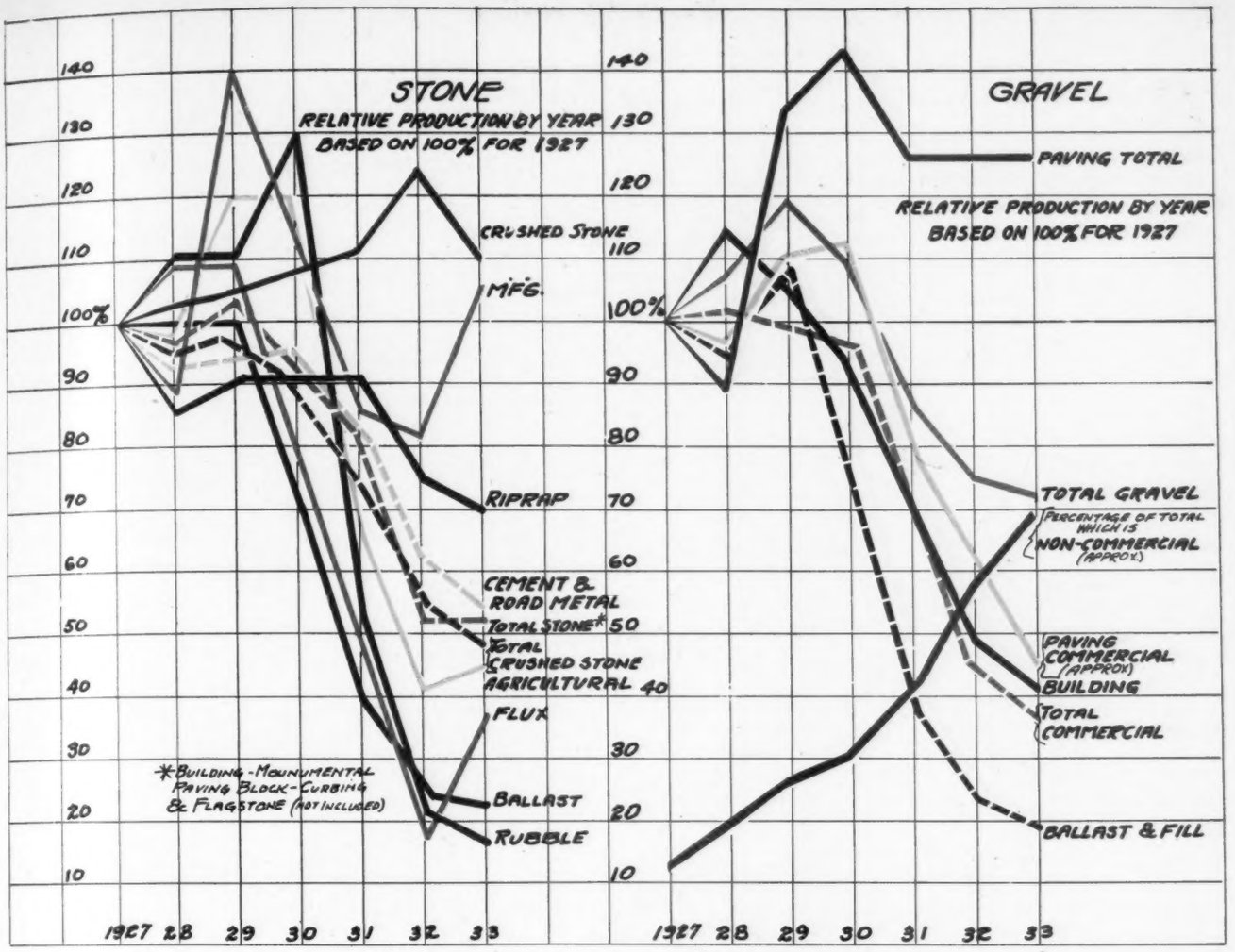
PRODUCTION CHARTS

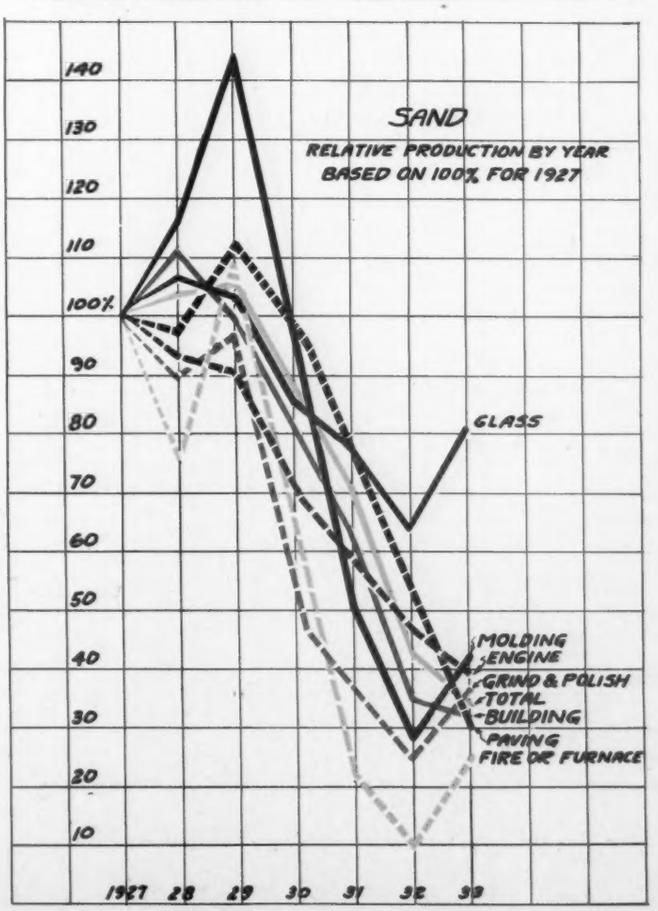
The four color charts presented on this and the following two pages, have been developed from the detailed records of W. E. Farrell, New York, N. Y.

The chart at the left shows the percent which non-commercial production was of commercial production (1932) for both crushed stone and sand and gravel. In this comparison, by districts, the year 1932 was chosen as it was a more nearly normal year than 1933 when commercial production was at its lowest ebb, and government production at near its greatest height—due to CWA (later FERA) which certainly is only a temporary condition. All signs now point to recovery of some of this business by commercial plants. (See editorial discussion on Pages 62, 63 and 94.) See top chart on facing page for further indication of trend in commercial and non-commercial production.

In the chart below, the relative yearly production of limestone, crushed stone and basalt is shown for several different states. Production figures for 1927 are taken as the basis of 100%.

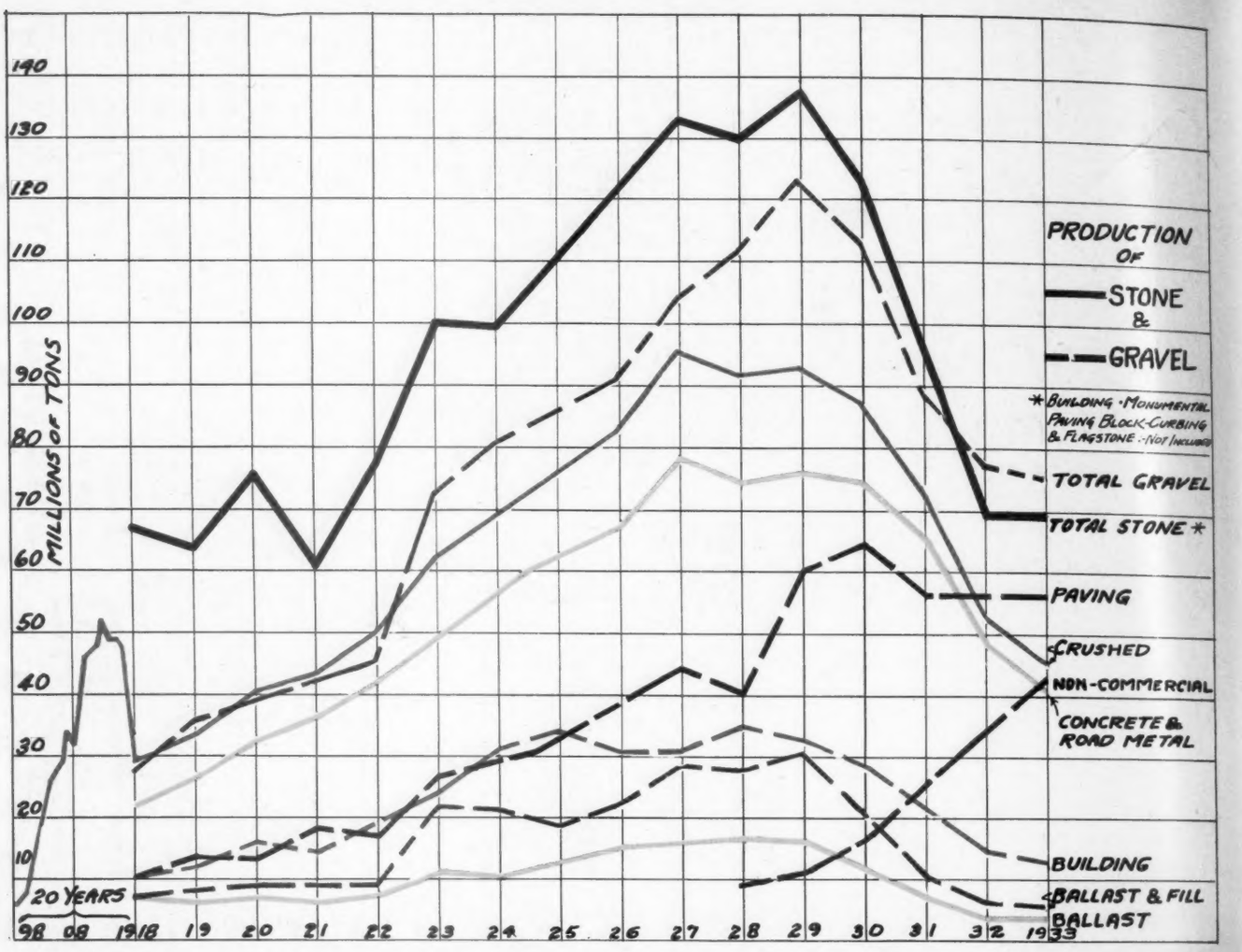






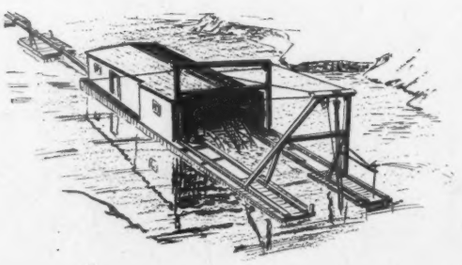
For stone and gravel, the above chart shows, separately, the yearly relative production (based on 100% for 1927), and the varying volumes required for different types of product, such as manufacturing, agricultural, etc. (for stone) and paving, building ballast, etc. (for gravel).

The chart at the right gives similar data on the relative production and utilization of sand. Note sharp upturn in glass sand production, beginning in 1932. All of the charts are based on records of W. E. Farrell.



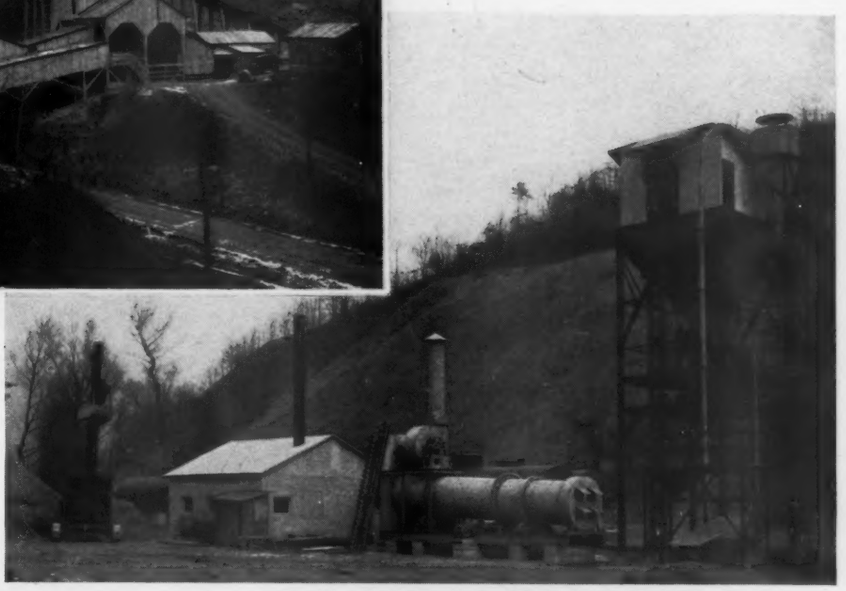
A long-range view of gravel production. Beginning with the year 1898 (for crushed stone only), the production of stone and gravel is charted above for the 1918-1933 period. In millions of tons, separate color lines indicate the ups and downs credited to stone and gravel totals, and material for ballast, building, etc.

Note the current "leveling off" of production lines that dipped from 1929 high-tonnage marks. Again note, in connection with preceding chart details (pages 71 and 72) the rapid rise in volume credited to non-commercial production.



Crushed Stone Producers Adds Black-Top Plants

Left: Crushing and screening plant of Quaker Sales Corp., Johnstown, Penn. (Plant is near Holidaysburg, Penn.) A bituminous materials plant (below at right) is one of the busiest departments of the company which has furnished a large volume of highway material. Many such bituminous plants have been added to plants in the past year



Right: Limestone dryer and treating plant on property of Quaker Sales Corp. The 60 by 28-ft. oil-fired combination dryer and cooler with feed elevator and exhaust fan, is in the foreground

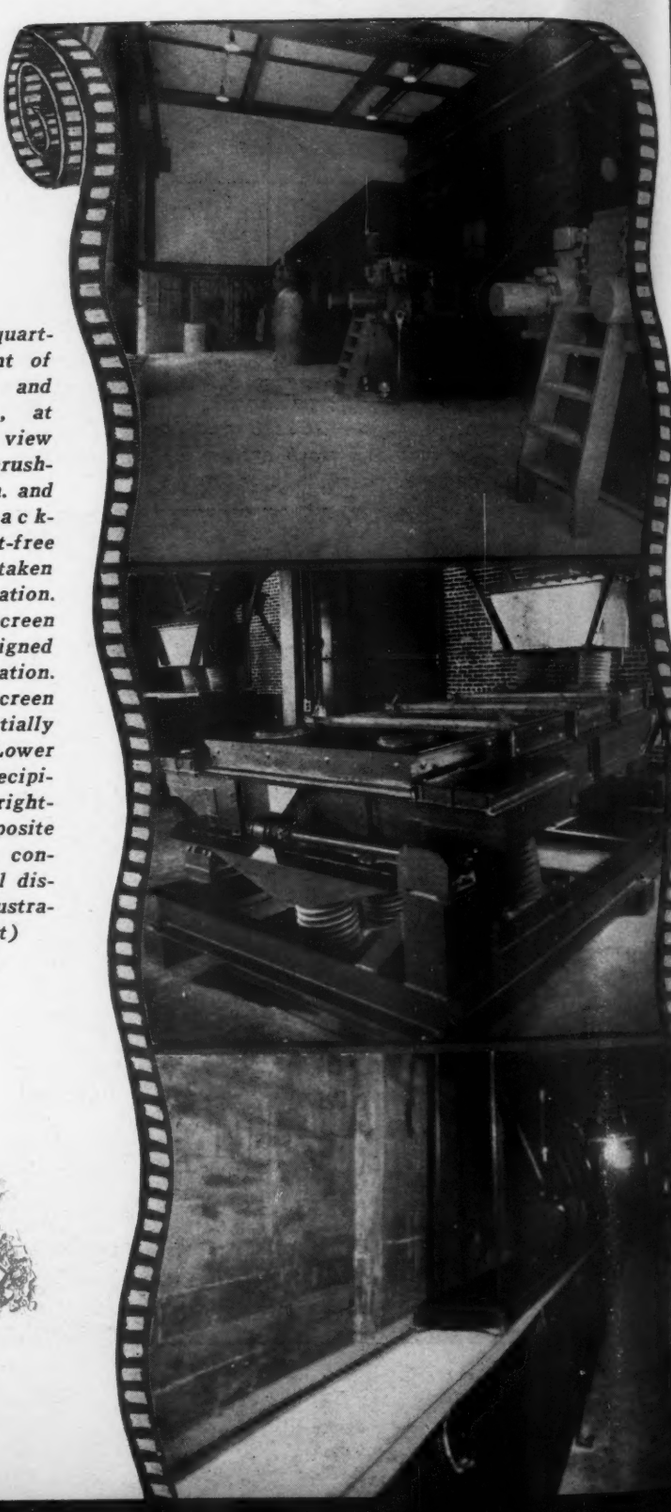
Below: View from top of crushing and screening plant of Quaker Sales Corp., showing quarry, face and track system for quarry cars

Silicosis Control in Ro

Vigilance on the part of operators of quarries and industrial sand plants, coupled with expert engineering counsel, has led to several specific improvements in the field of silicosis control. Interest in welfare of employes subjected to the dust hazard and also the increasingly stringent laws relating to employers' liability have emphasized the problem of dust prevention. Some of the advances in dust control practice are illustrated here.

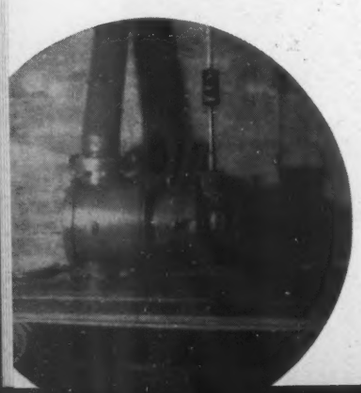
The subject is of greater importance now than heretofore, due to inclusion of rules, designed to cut down the silicosis hazard, in the code of the crushed stone, sand and gravel and slag industries. At present, these rules do not apply probably to many operators who are not quarrying and processing silica rock, but eventually they may come to be applied to rock dusts not generally considered harmful in the light of our present knowledge of silicosis and allied dust diseases.

At the left is a sequence of four pictures showing how dust control is attained in drilling operations by drill hood (the two top views) and by suction tube lines

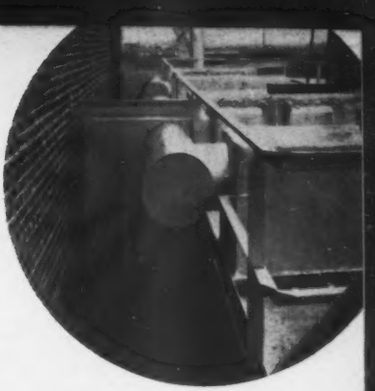


Right: Views in the quartzite processing plant of Minnesota Mining and Manufacturing Co., at Wausau, Wis. Top view shows sealed roll-crushing units (two 42-in. and one 54-in.—in background.) Note dust-free air—picture was taken during capacity operation. Center: Choke-fed screen unit specially designed for dustless operation. All crushers and screen operate in a partially sealed vacuum. Lower view: Fines from precipitator (see upper right-hand picture on opposite page) emerging on conveyor fed by special discharge valve (see illustration at lower left)

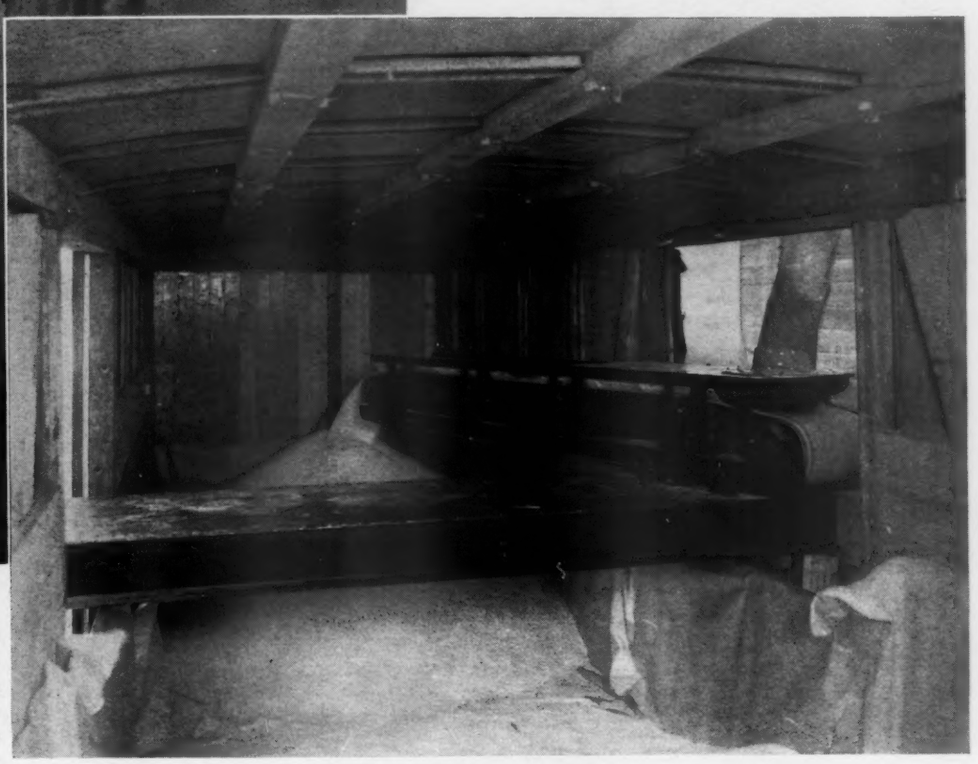
Below: Centrifugal, self-sealing valve discharge to waste-product belt in quartzite crushing and screening plant. (See additional views in "film strip" at right)



Rock Products Industries

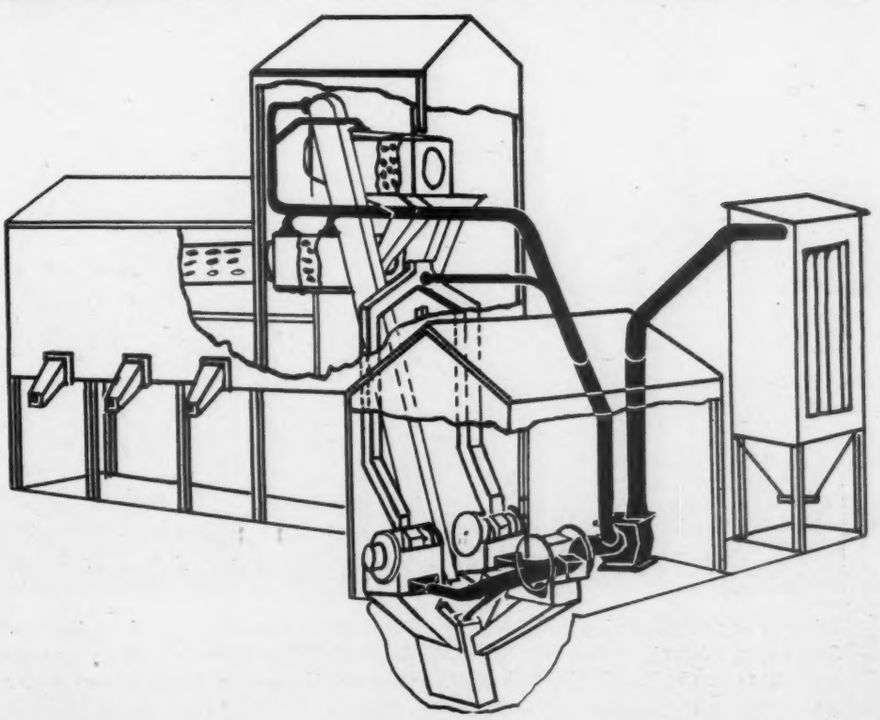


Above, right: Partial view of electrical dust precipitation installation on exterior of new plant built at Wausau, Wis. (See illustrations on opposite page)



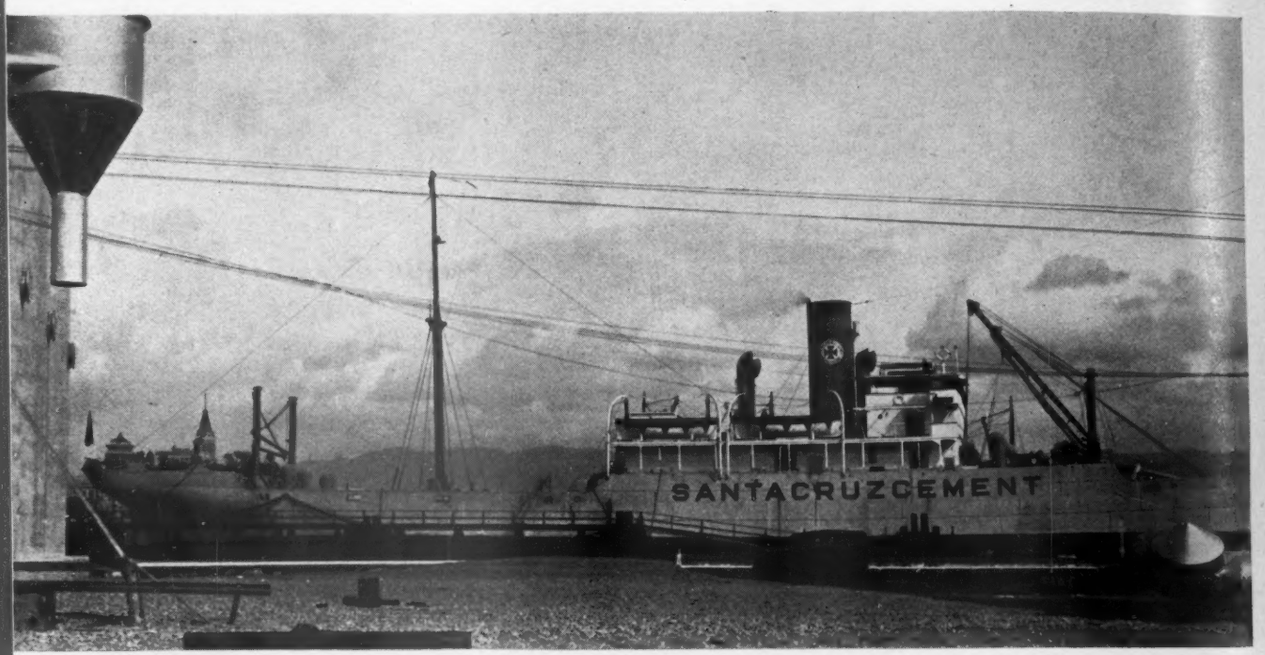
The two illustrations above show different methods originated for discharging bulk silica from silos into box cars —by partially sealed trunk lines—and by hooded conveyor. Both tend to limit dust generation in loading operations, but efficiency depends in part on rate of discharge

Below, at right: Dust reclaiming plant of English design. Suction is provided at elevator head, selector screen, main screen, granulator, crusher, elevator boot casing and at junction of chute (bending upward and to left.) Substructure at right contains bag filter dust collector.



Shipping Facilities Improved: E

For additional views, see the following page



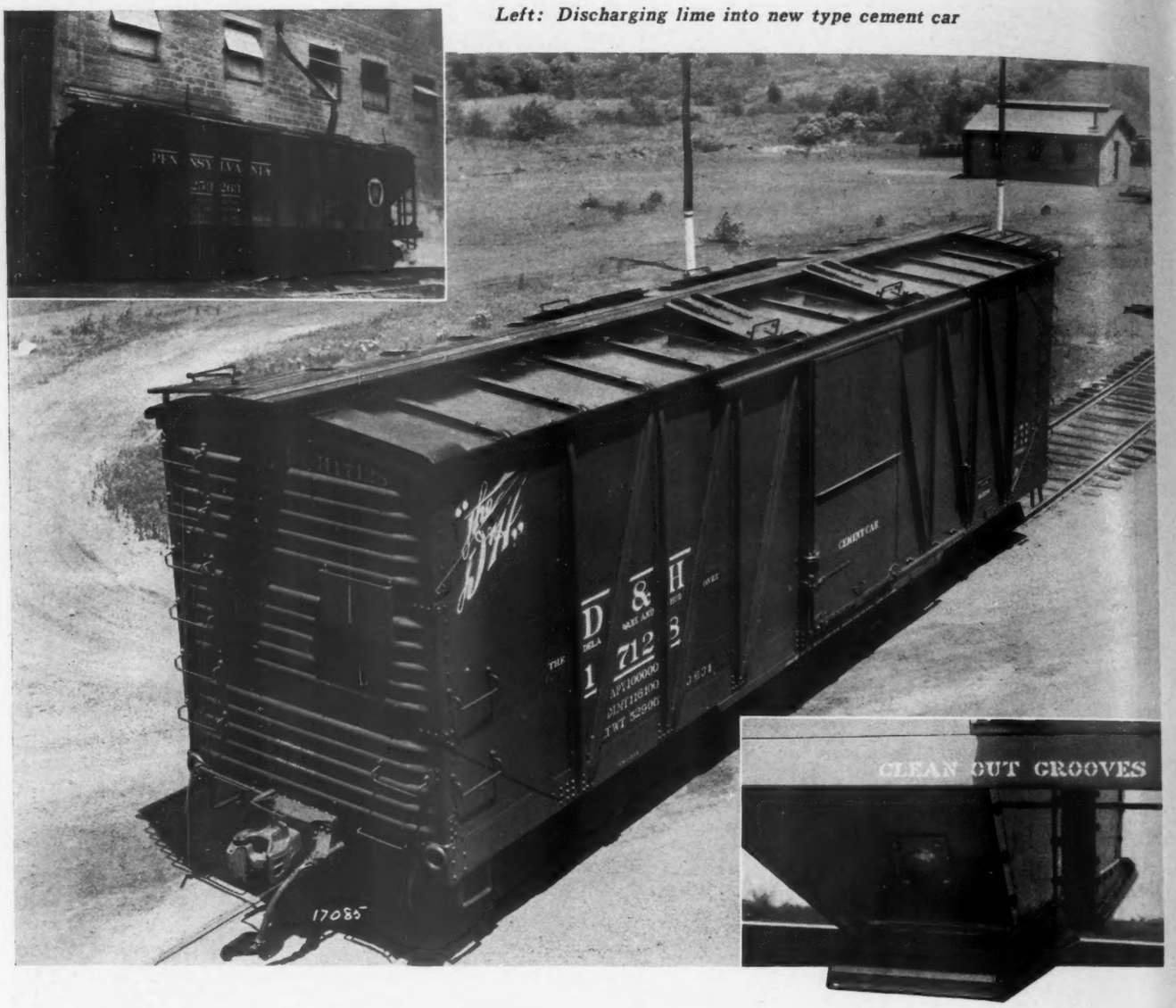
View at top of page shows the cement ship "Santacruzcement" at the wharf in Oakland, Calif. It is operated by the Santa Cruze Portland Cement Co., Santa Cruz, Calif., in connection with its recently established packing plants at various points on the Pacific Coast. Lower view shows the company's silos, pack house and manager's home at Stockton, Calif.

Economical Cement Handling

Improved railroad cement car units shown on Page 82

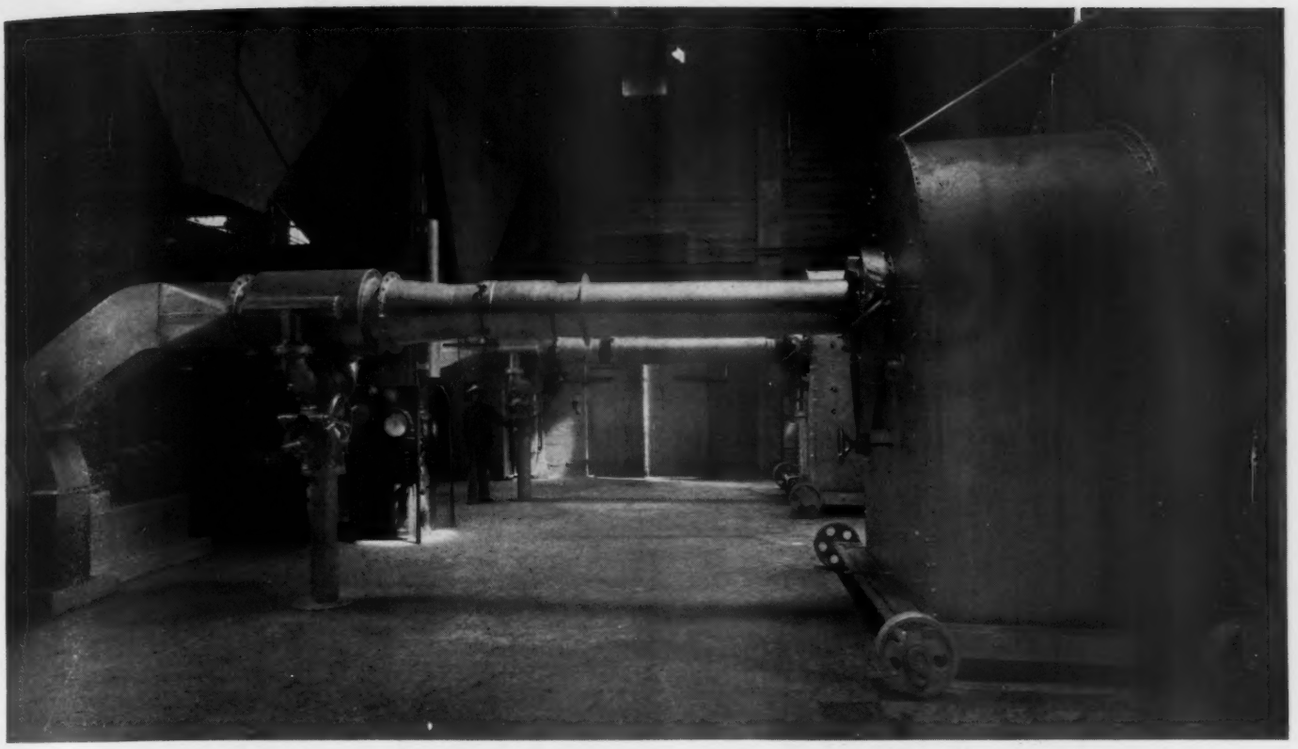
Loading facilities of the Santa Cruz Portland Cement Co. at Santa Cruz., Calif. The cement ship "Santacruzcement" may be seen (top view) at the end of the company's 2,400-foot pier. Lower view shows shore end of pier with detail of expansion guides on 12-in. cement pump lines. Note railway for sacked cement

Left: Discharging lime into new type cement car

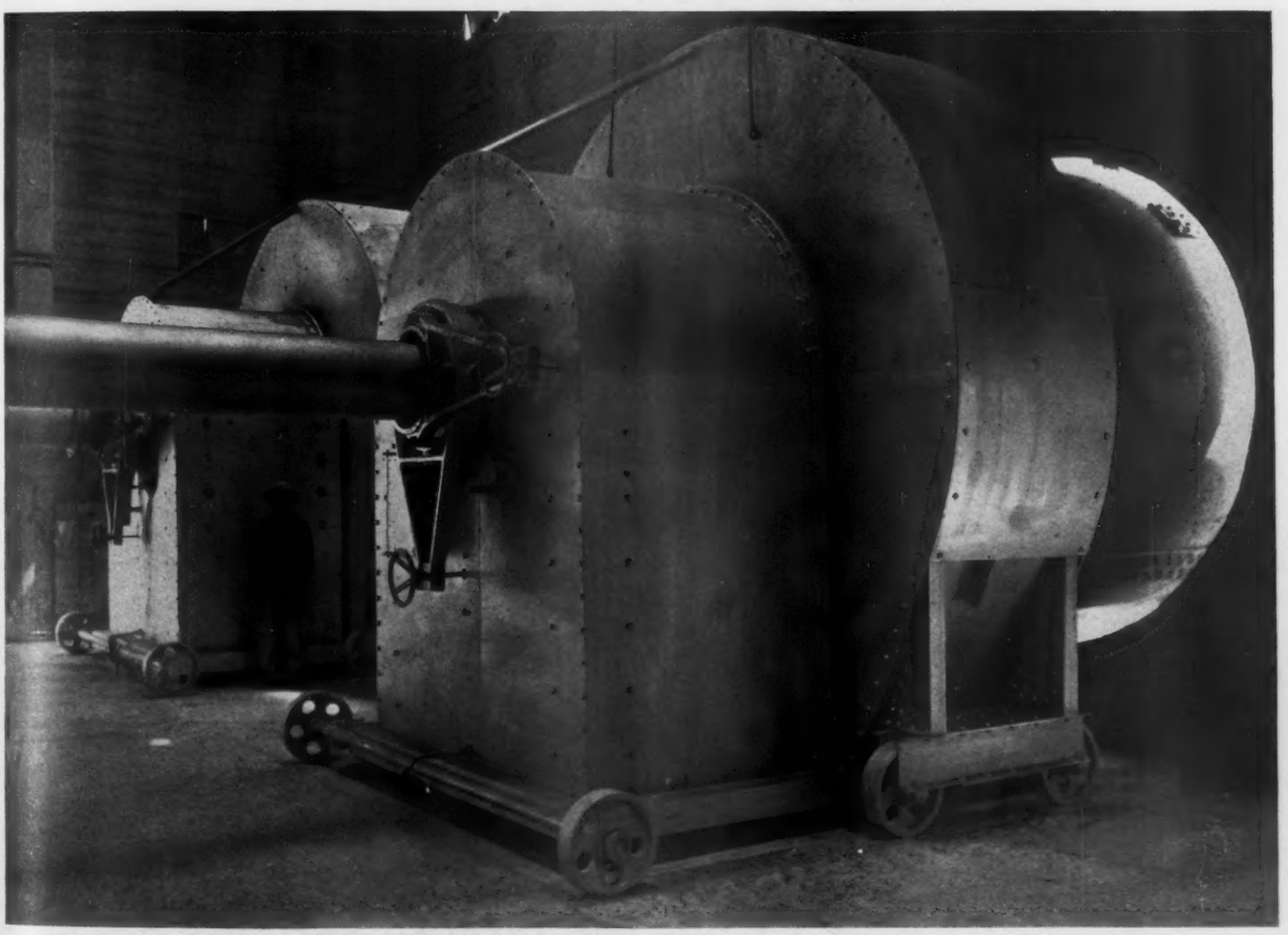


Two new types of cars for bulk shipments of cement, lime, etc. Upper left is reconstructed open-top hopper car; center and lower right (see inset for hopper-discharge detail) is a reconstructed steel frame box car with hoppers added

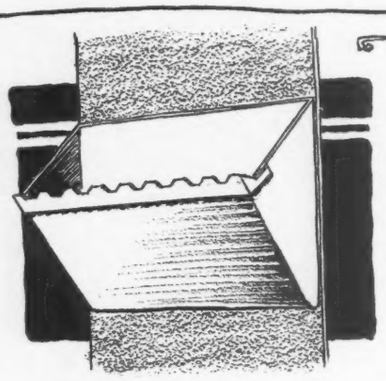
Below: The "Dolomite I," combination canal and lake boat, equipped with self-unloader for cement and other granular materials at wharf



Among the growing number of cement plants recently furnished with new clinker cooler equipment to economize heat and improve clinker quality is that of the Oklahoma Portland Cement Co. at Ada. Above is the burning floor, showing arrangement of gas mixers, burners, primary air fans and kiln hoods. Below is a closeup, showing kiln hoods and bustles. (For clinker cooler illustrations in this plant, see Pages 90 and 91)

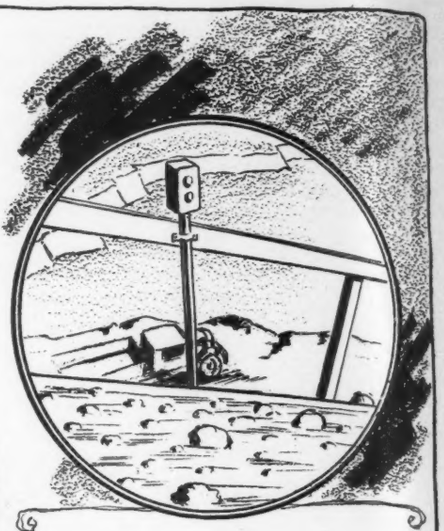


How Superintendents Solve



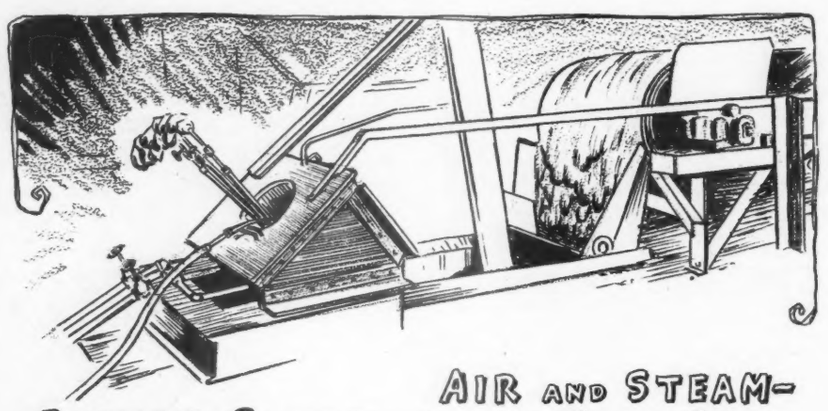
WELDED LIPS—BUCKET MONEY SAVED

Ordinary buckets had extraordinarily short life at a California sand and gravel operation where the gravel strata is firmly "cemented" in hardpan formation. Ernest Moyer, Alturas, Calif., tells how the difficulty was met: "Lips have been welded on all buckets which carry the heavy sand on a wet elevator operated at 450 ft. a minute. Every fourth bucket now has a saw-tooth lip, and this also has improved operation of the elevator. Bucket life has been increased."



HALF-WAY STOP—SAFETY

At one of the commercial plants of the Rosenbarger Sand and Gravel Co., Indianapolis, Ind., electric start-and-stop button control is provided for the main gravel conveyor which rises from hopper to top of the plant. Sketch shows the control unit at one side of the skirt board, half way up the incline conveyor line which is 225 ft. between centers. An attendant is always near at hand, picking oversize and foreign material from the 24-in. rubber belt, and in case of trouble, he can shut off the power much more promptly than is possible when waving or shouting must be resorted to for signals to the operator of the main controls at top or bottom of the plant. Speed of this belt recently was increased to 450 ft. a minute.



AIR AND STEAM—BETTER SLURRY FILTER-CAKE FEED

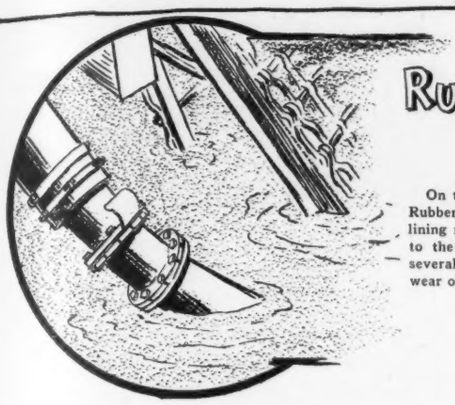
You can look right down into the feed ends of cement kilns in action at the Dewey Portland Cement Co. plant, Davenport, Iowa. It's probably the only cement plant in the world where such a "look-see" may be had—because of the ingenious slurry filter-cake feed arrangement shown here. The screw feeder has been removed. Two compressed air jets and one steam jet have been substituted. One of the air jets overcomes kiln draft and keeps dust and flame from shooting out as the slurry is discharged into the kiln. The other air jet is used as a poke rod if and when slurry accumulates in the passage The saturated-steam jet is used to lubricate the chute. No appreciable back draft, with loss in the waste-heat utilization, has been noted.

SUSPENSION CONVEYOR—$1500 SAVED

Last winter, Superintendent R. H. Ashley had his small, year 'round crew saw barrels in half, fill them with concrete, slide them out on the ice near the McGrath Sand and Gravel Co. plant, Pekin, Ill. Then the ice was cut from beneath them, and they sank in 15 ft. of water. Anchored in the concrete were old sections of dredge pipe (joined by X wires) and these were used as supports for the unique 395-ft. suspension conveyor sketched here. Cost of lumber, labor, piling, etc., to support the usual pipe line equipment would have been around $1,500. The temporary installation saved this—plus wear and tear and pumping charges on a long pipe line. The conveyor is fed by a drag scraper which delivered, the past season, over 30 tons of material per hour. Total weight of conveying apparatus: 20 tons. Conveyor: 24-in., rubber—run by 35 hp. motor. The wire cable: 1¼-in. strands.

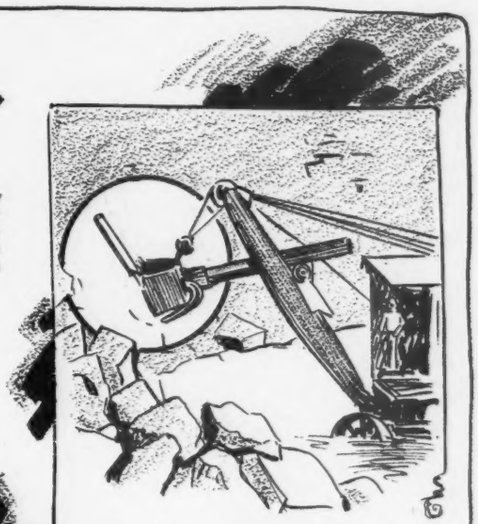
Daily Plant Problem

HINTS & HELPS ON DAILY OPERATING TECHNIQUE.



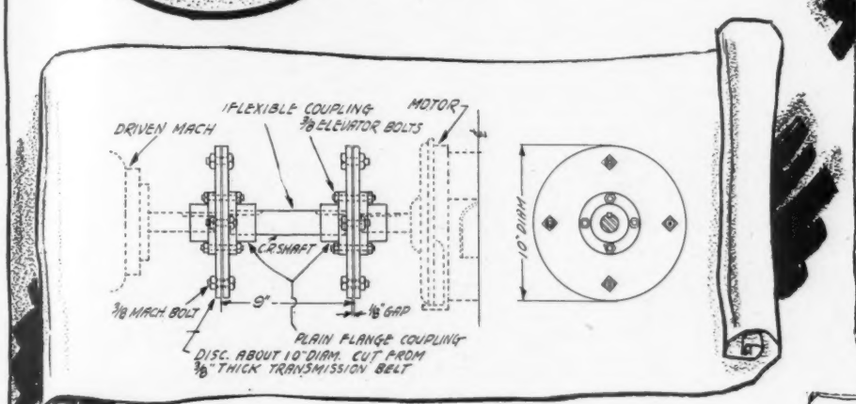
RUBBER LINING— ECONOMY

On the 12-in. dredge pipe (see drawing) used by Rubber City Sand & Gravel Co., Akron, Ohio, rubber lining now is used on all pipe sections from intake to the pump. Although the rubber-lined pipe is several times the price of standard pipe, the extra wear obtained more than pays for the added cost.



PIPE PUNCHER

To coax loosened stone from quarry ledges, the River Products Co., Iowa City, Iowa, uses a pipe on a dipper tooth for a "ram-rod."

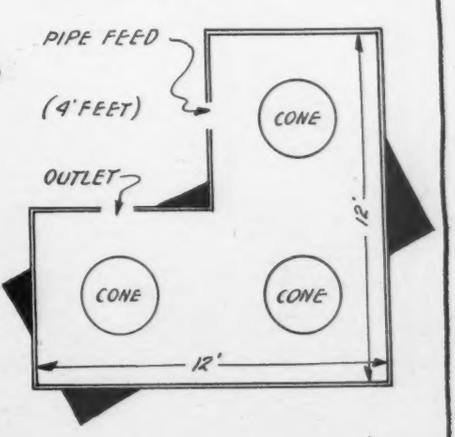


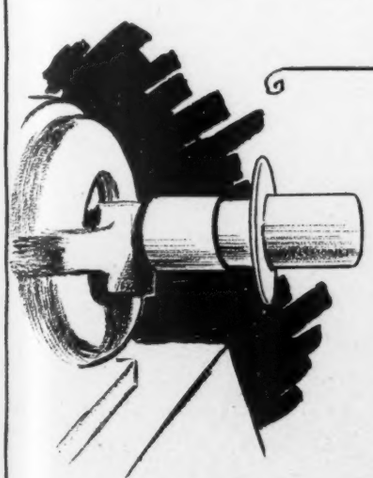
FLEXIBLE COUPLING— PLUS

'I have made a coupling (see sketch) of my own design," says a New York crushed stone plant superintendent, "which besides acting as a flexible coupling, performs much like a universal joint as it permits great angularity between motor and the vibrating screen, for which 'hookup' I devised this. (Whenever a screen support breaks, considerable angularity develops. This puts great stress on the ordinary styles of coupling and we could not keep them in working order.) Some of my couplings have been in continuous, trouble-free service for six months. They're made in our own shop of four flanges turned from cold roll shafting. Flanges are fastened to a shaft, and to each flange is bolted a circular piece of transmission belting."

L-SHAPED FLOW BOX— FINES SAVED

Confronted with the problem of a straight flow box which, because of a strong current, often wasted too much fine sand, Superintendent A. H. Warnick, of the Neal Gravel Co. plant, Attica, Ind., devised the L-shaped sand box shown in the diagram. It is fed through a 4-in. pipe from a 3 by 6-ft. vibrating screen which discharges everything from its bottom (⅛-in. screen) deck, to the box. Equipped with three sand cones, the L-shaped box retards the flow of water and sand sufficiently to allow enough fines to be reclaimed to meet requirements.

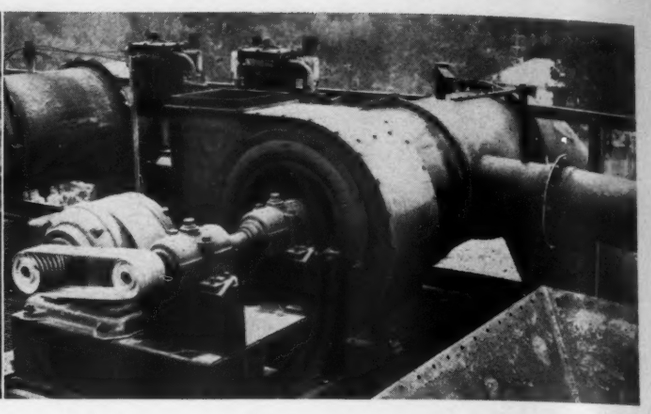




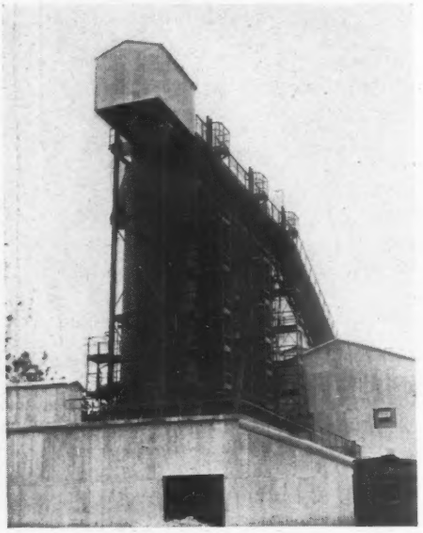
PULLEY FLANGE— DUAL DUTY

E. R. Beaver, superintendent of the W. C. Babcock Grain Co., quarry, Rensselaer, Ind., gets double duty from a 50-hp. motor by the arrangement illustrated here. The metal flange built onto the fibre pulley (9¾ in. diameter) separates the 18-in. pulley into two sections. The 8-in., 6-ply woven belt on the "inside track" drives crushing equipment and furnishes power to haul 1½-ton quarry cars up a 150-ft., 30-degree incline. A second belt is attached intermittently to drive a 10 by 10-in. compressor unit.

—Baki—

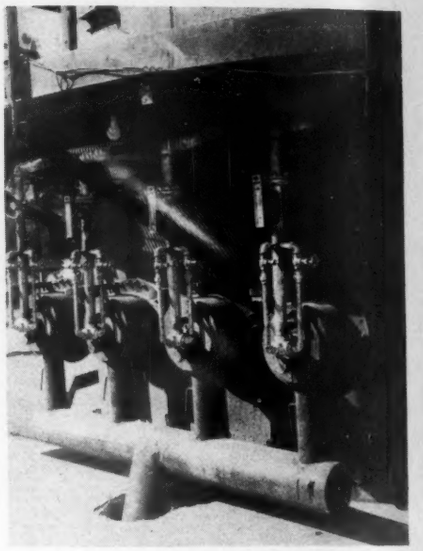


Left—Kiln charging door, fan and rock car. Right—Kiln fan with water-cooled bearings, motor and V-belt drive

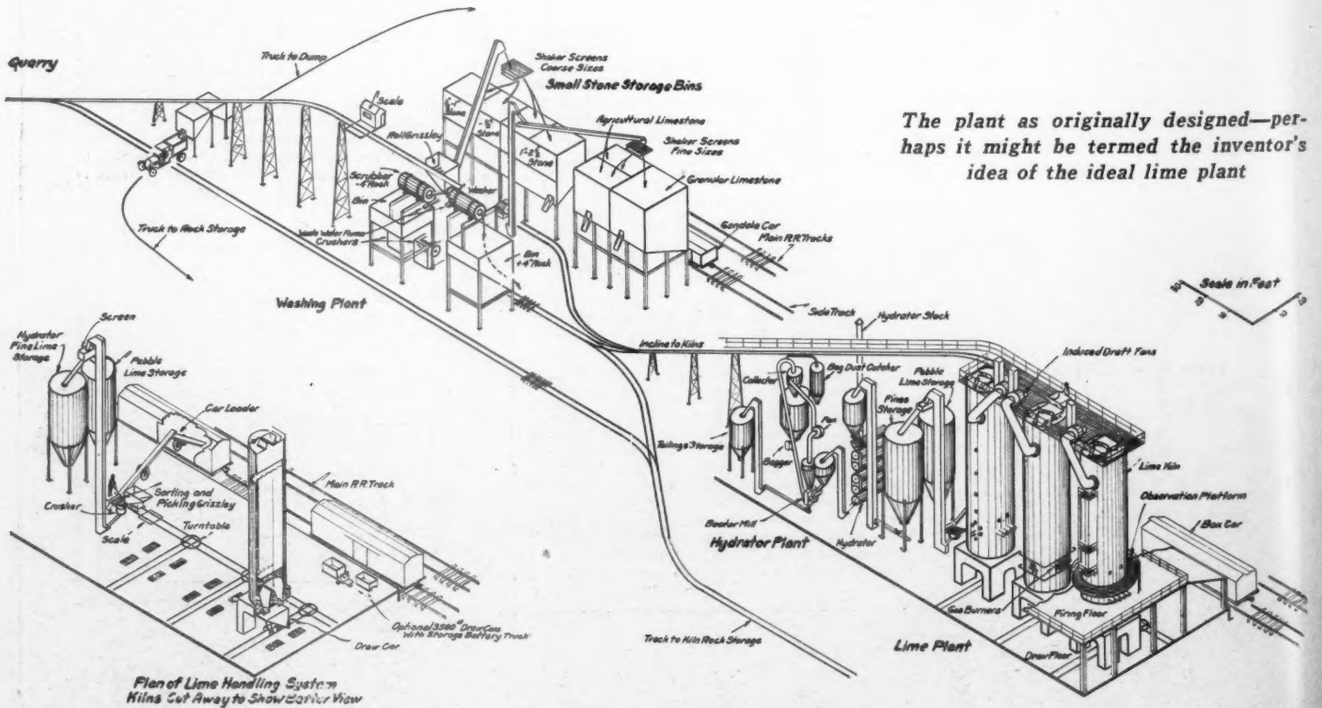


End view of kilns

Details of the new plant of the Louisiana Lime Products Corp., Easton, La. Kiln tops are sealed. Forced draft fans with water-cooled bearings remove the exhaust gases at a temperature between 700 and 800 deg. F. Kilns are equipped with up-to-date control equipment, gas meter, gas analyzer, etc.



Gas burners—ten in all



Plan of Lime Handling System Kilns Cut Away to Show Earlier View

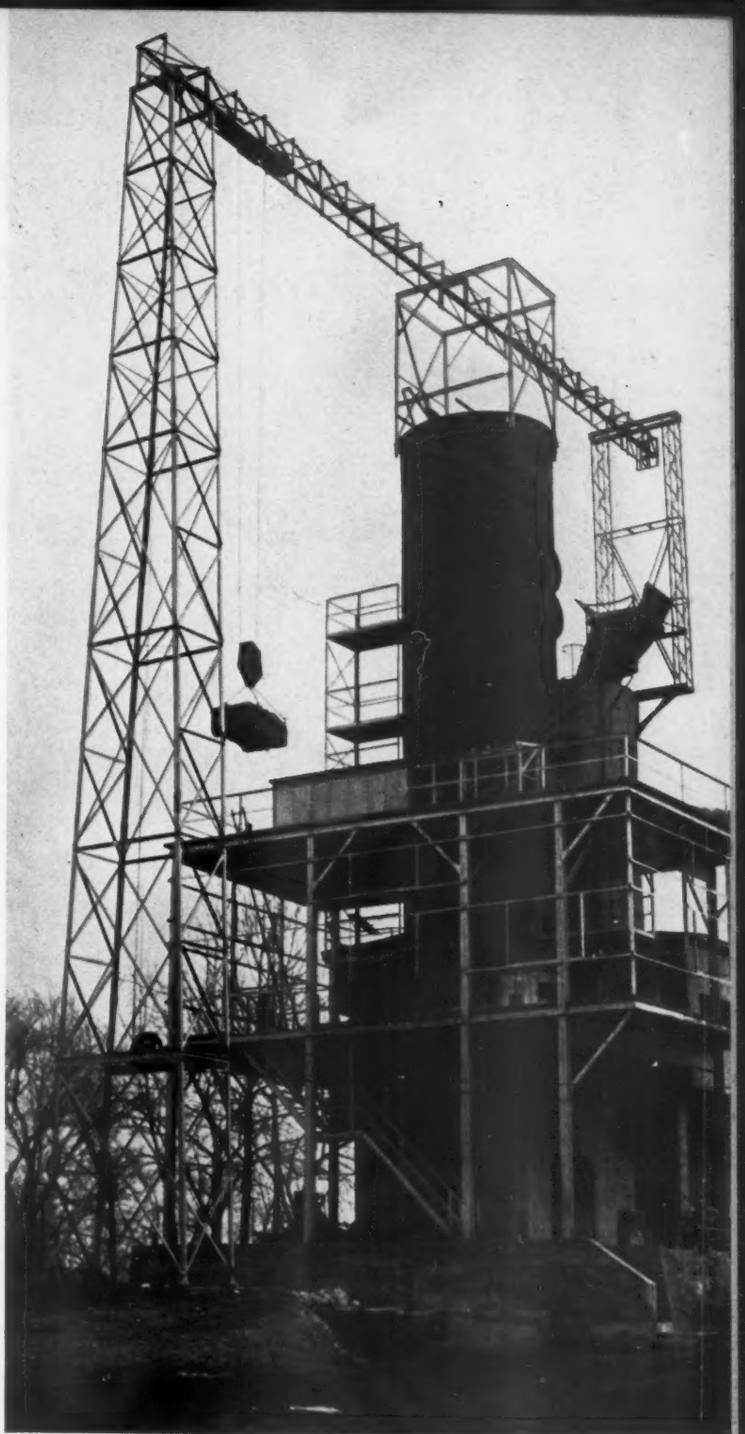
The plant as originally designed—perhaps it might be termed the inventor's idea of the ideal lime plant

Latest in Lime Plant Design!

On the opposite page is the newest lime plant, completed in 1934, the Louisiana Lime Products Corp. The isometric drawing shows the designer's (Victor J. Azbe) original conception. The other illustrations show details developed by him.

This was probably the first lime plant designed from start to finish to burn natural gas and using the exhaust from the kilns to dilute or temper the gas flame, as well as to utilize efficiently the heat in the otherwise waste gases.

On this page is a still more recent lime plant in which the designer has endeavored to bring to greater perfection some of the ideas applied in the other. This is the new Glen Park plant of the Glencoe Lime and Cement Co., now nearing completion, also designed for natural gas. Note the kiln feeding arrangement and the compactness of the design.

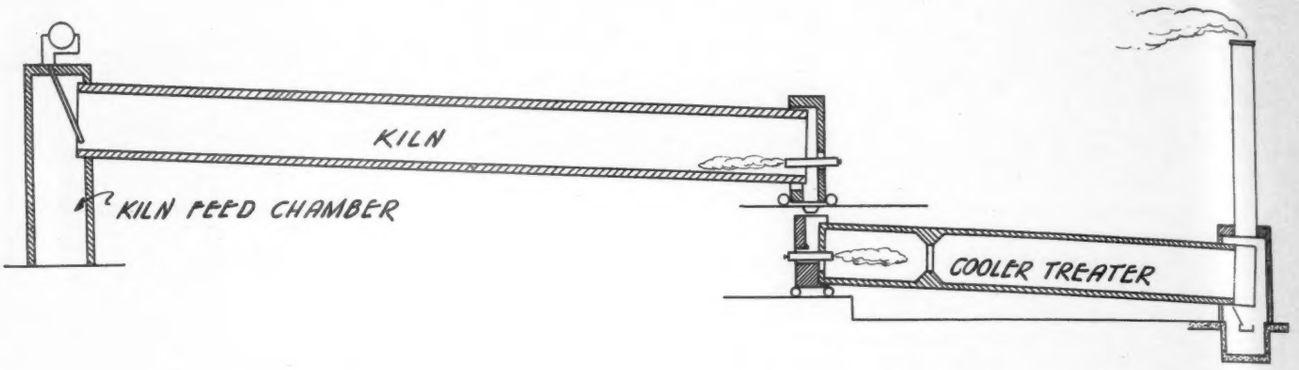


Right—End view of the nearly completed Glen Park, Mo., plant of Glencoe Lime and Cement Co.

Below, left—Piping where natural gas enters the plant, is metered and its pressure reduced

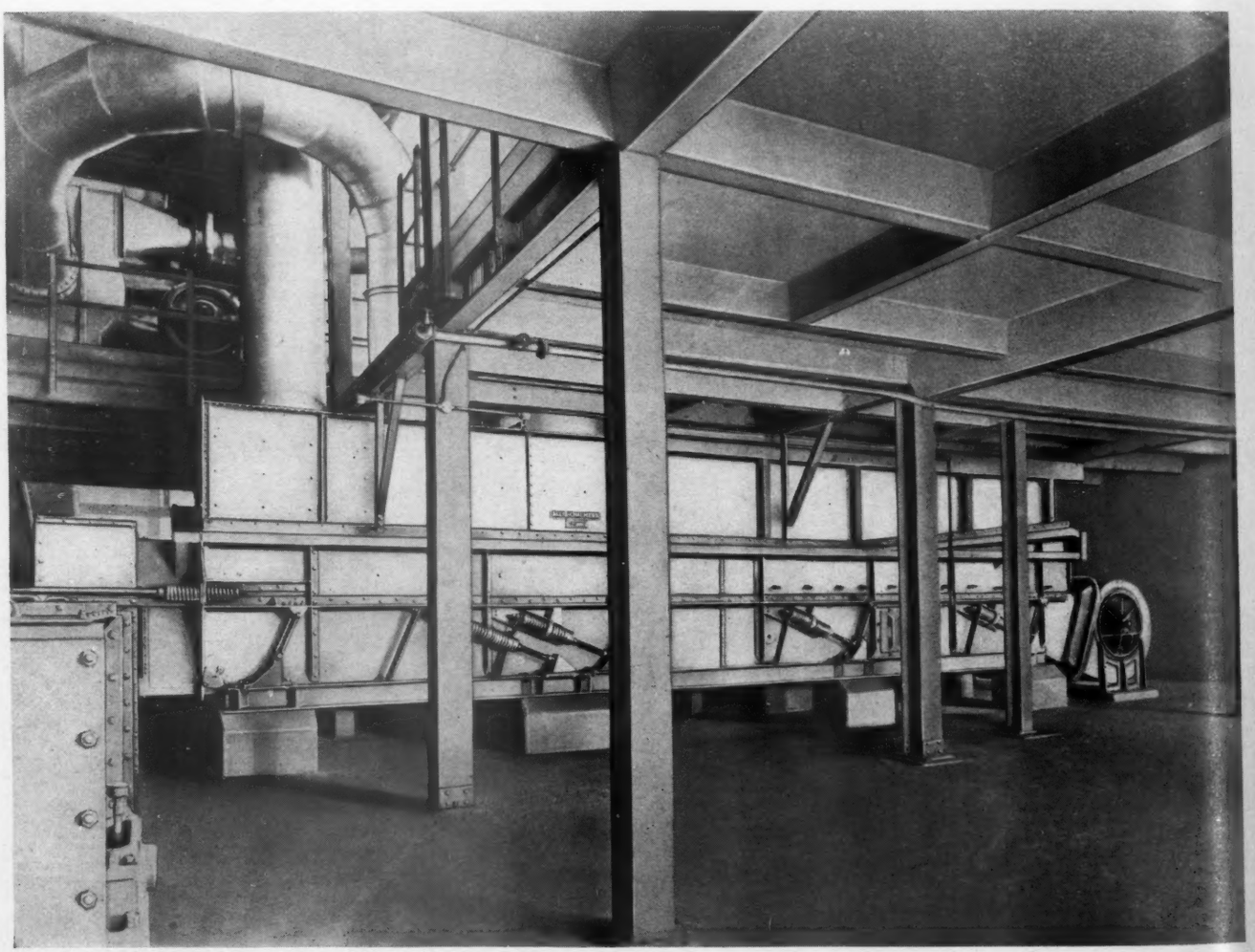
Below, right—Gas burners of the old reconstructed kiln, showing also poke-hole doors, gas meter, draft gage and air and gas manifolds

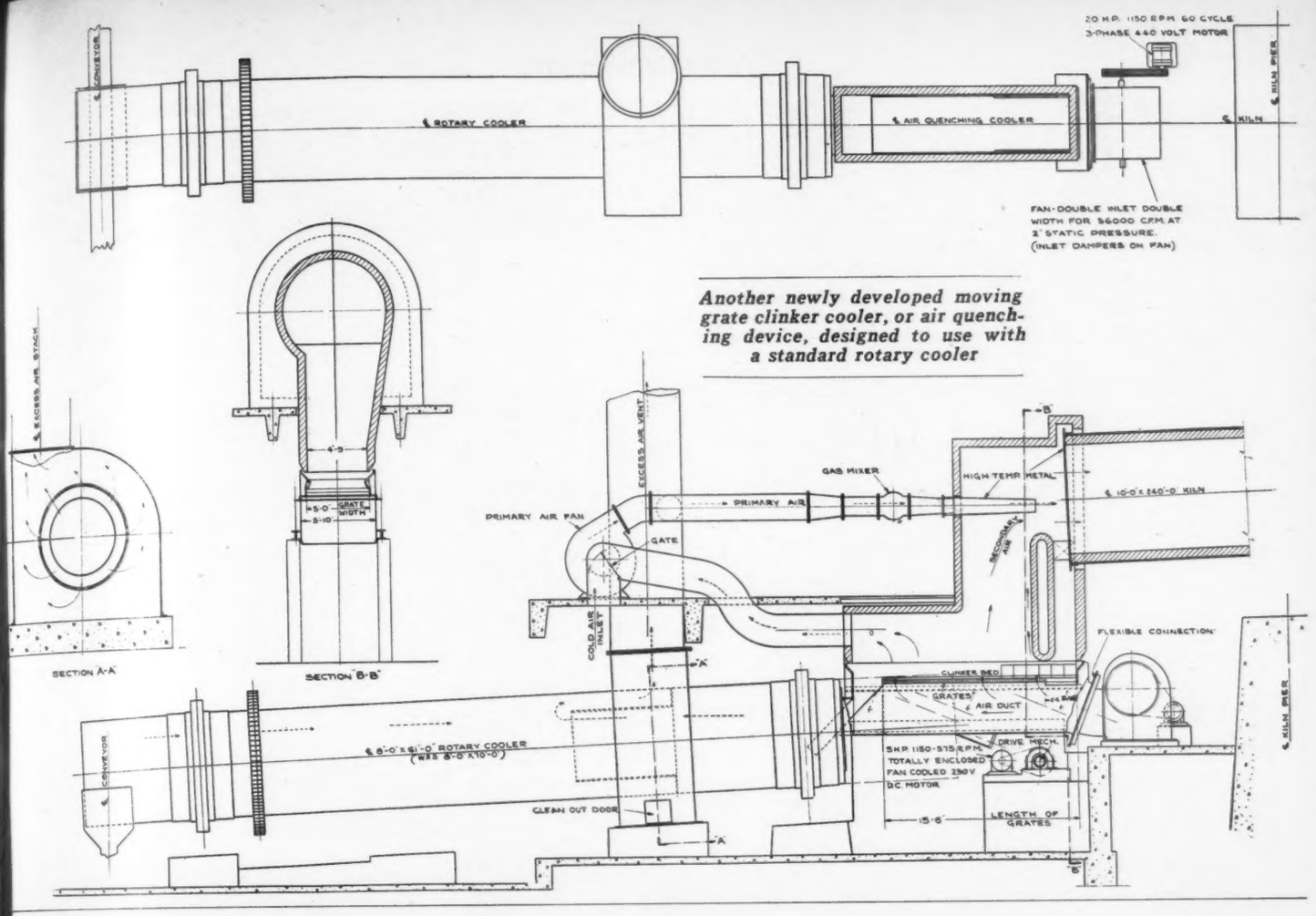
Clinker Treatment Equipment Designed for Heat Economy and Improvement of Clinker



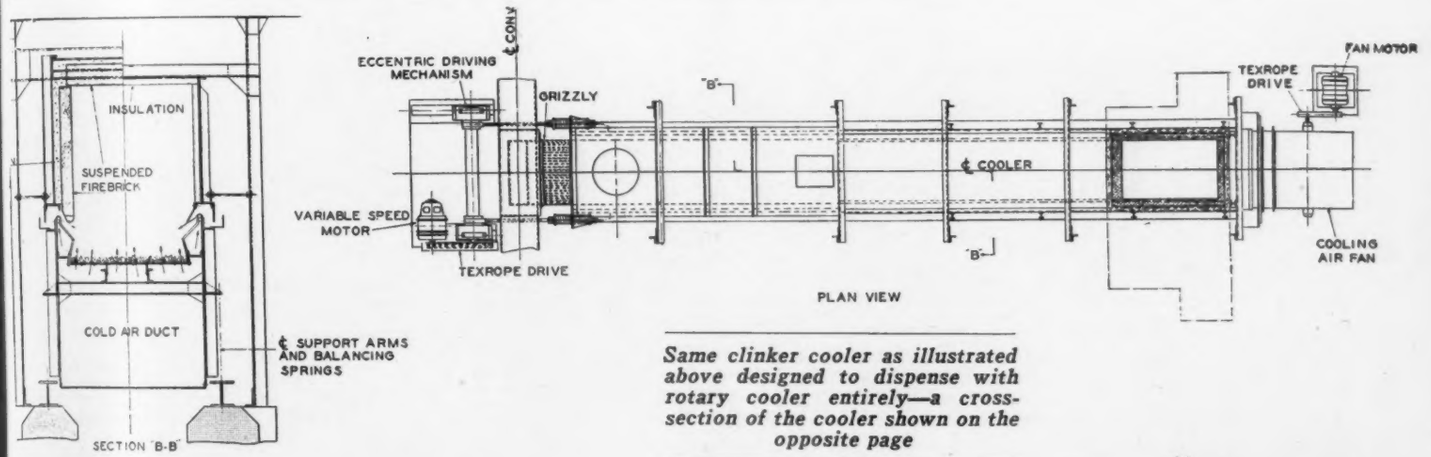
Above: Device developed at Yosemite Portland Cement Co. to cool clinker in a reducing atmosphere, first reheating or regenerating it to obtain the best results. A markedly improved clinker, easier to grind and making a better cement, was the result.

Below: One of two newly installed shaker-grate-type clinker-cooler units installed in Alpha Portland Cement Co. plant, Cementon, N. Y. They are connected directly to kilns for heat recovery. (See description on Page 41 of Rock Products for January 1—additional plant views on Pages 54 and 55 of this issue)

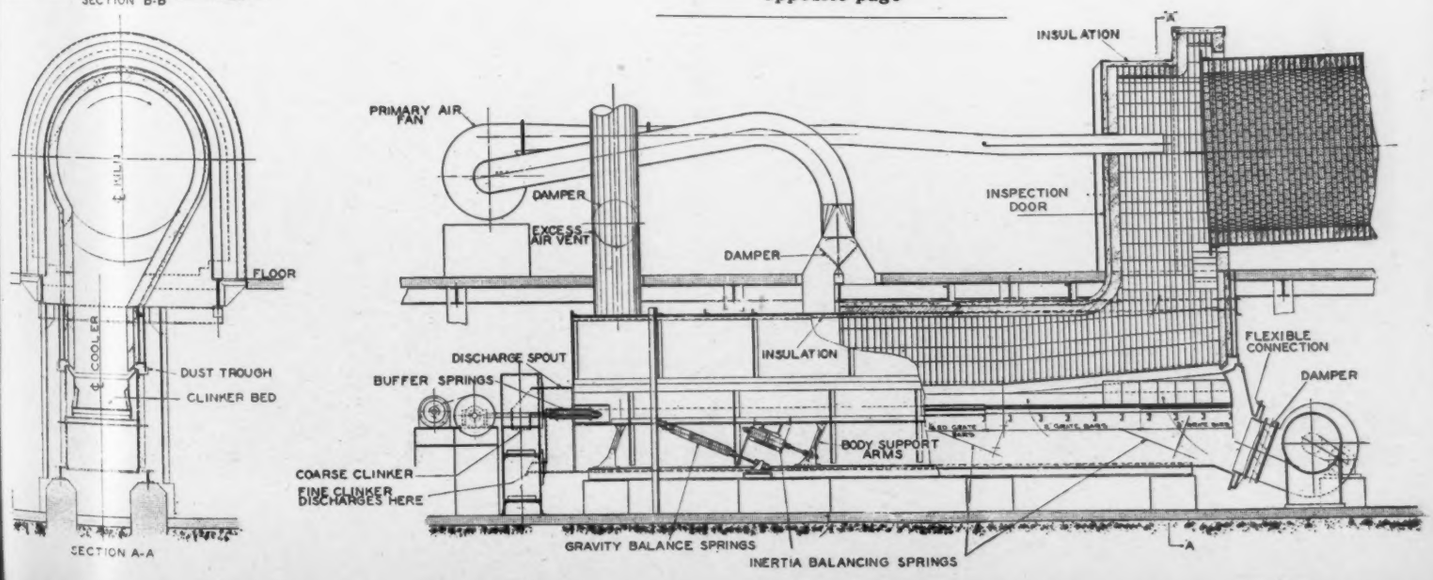




Another newly developed moving grate clinker cooler, or air quenching device, designed to use with a standard rotary cooler

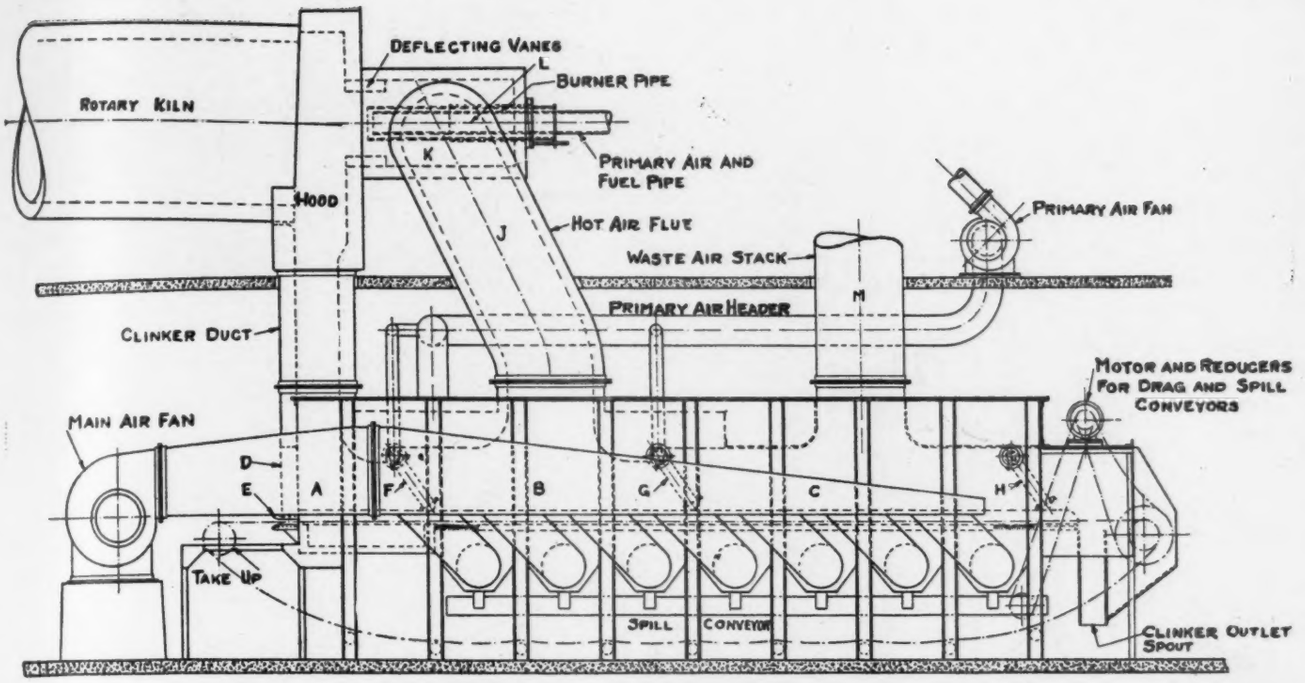


Same clinker cooler as illustrated above designed to dispense with rotary cooler entirely—a cross-section of the cooler shown on the opposite page

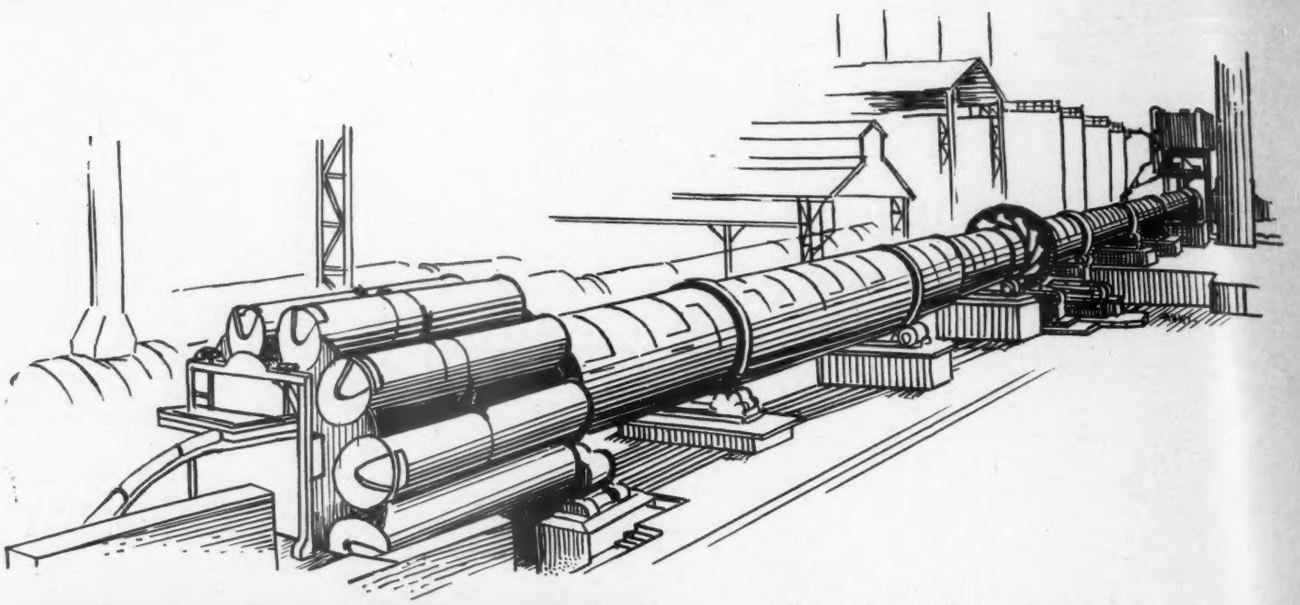


Discharge end of new cooler equipment in plant of Oklahoma Portland Cement Co. at Ada. Note secondary air fans and cooler drag drive arrangement. The new coolers, for the plant's No. 2 and No. 3 kilns have been in operation since July 5, 1934. Both kilns are 240 ft. long. The No. 2 kiln has a straight 10-ft. diameter; No. 3 unit has an enlarged burning zone of 11 ft. 3 in. for the first 33 ft.

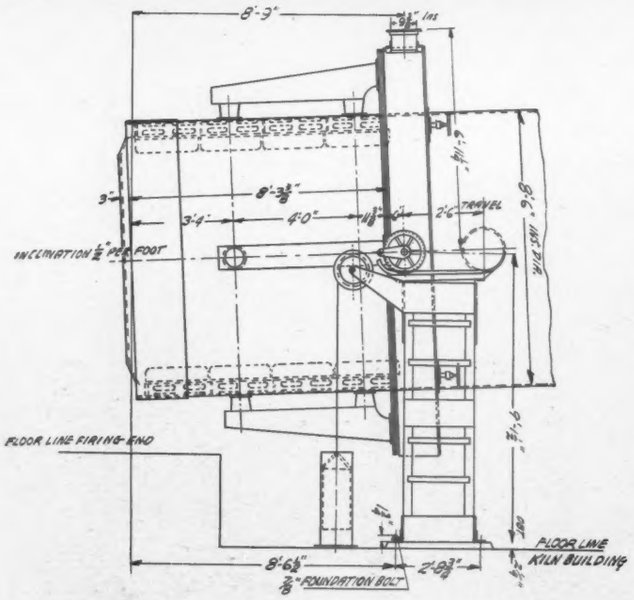
***Left:** The new clinker cooler in the Oklahoma plant, showing seal gate counterweight, seal gate air-discharge pipe and access door in end of cooler. (See additional view and diagram on opposite page.) With the improved clinker cooling apparatus in operation, the Oklahoma Portland Cement Co. now has under construction a new waste heat boiler plant consisting of twin water tube boiler units, five-drum type. Each boiler will have a heating surface of 11,652 square feet. M. O. Mathews, manager, reports that the new installation will be put in operation about the middle of February*



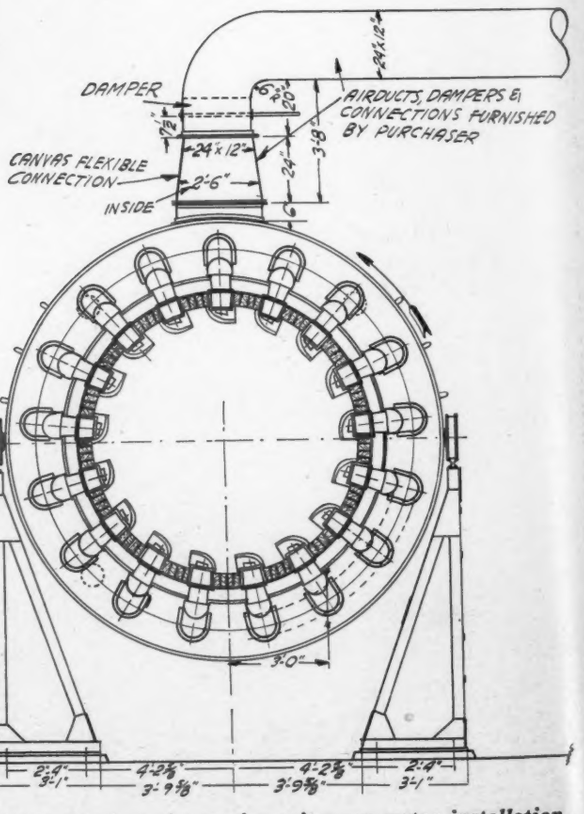
Above: Cross-section of the clinker cooler shown in the accompanying pictures (below and on opposite page). View below shows discharge end of coolers. Note drives and drag conveyors from coolers to storage elevator



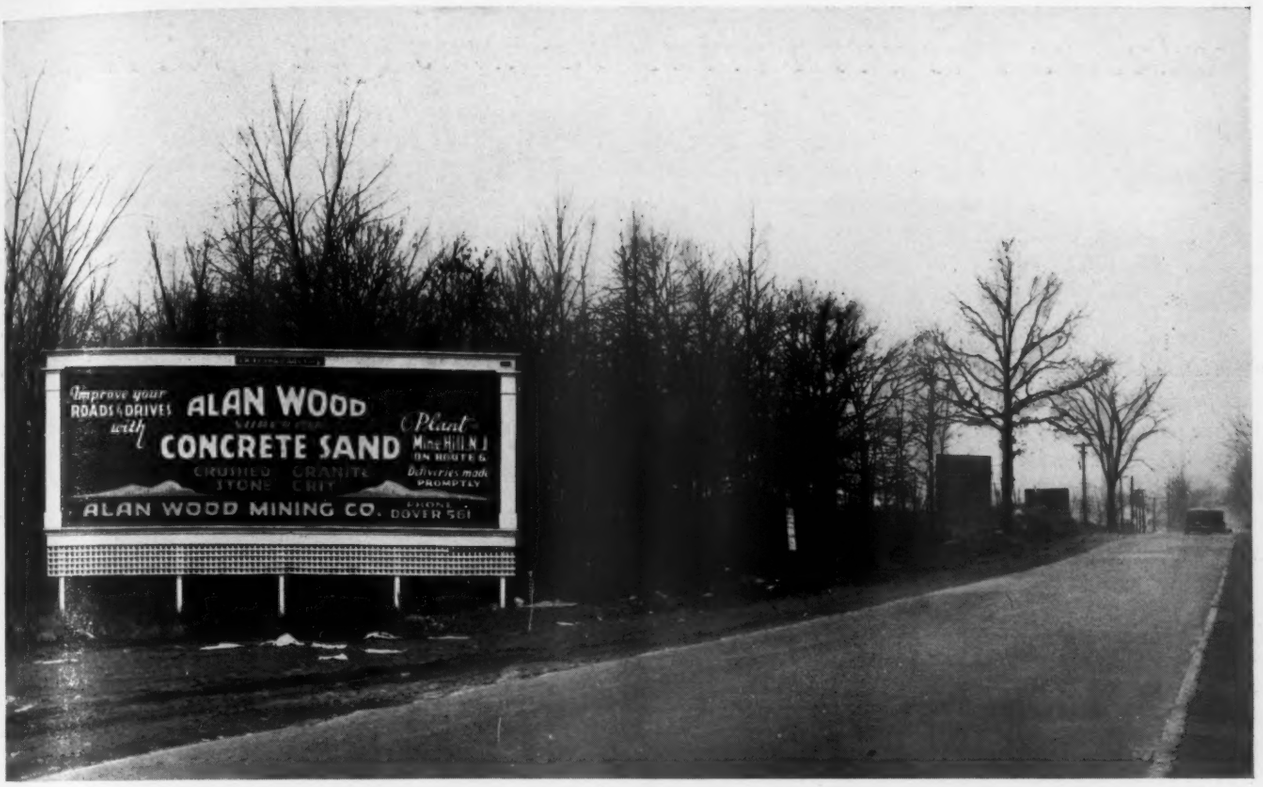
Above: Kilns 400 to 500 ft. long are now used for heat economy and for improving the quality of clinker. (To left and below) A depression-developed device for quickly air cooling or air quenching clinker, and saving the heat, already installed by several progressive portland cement manufacturers



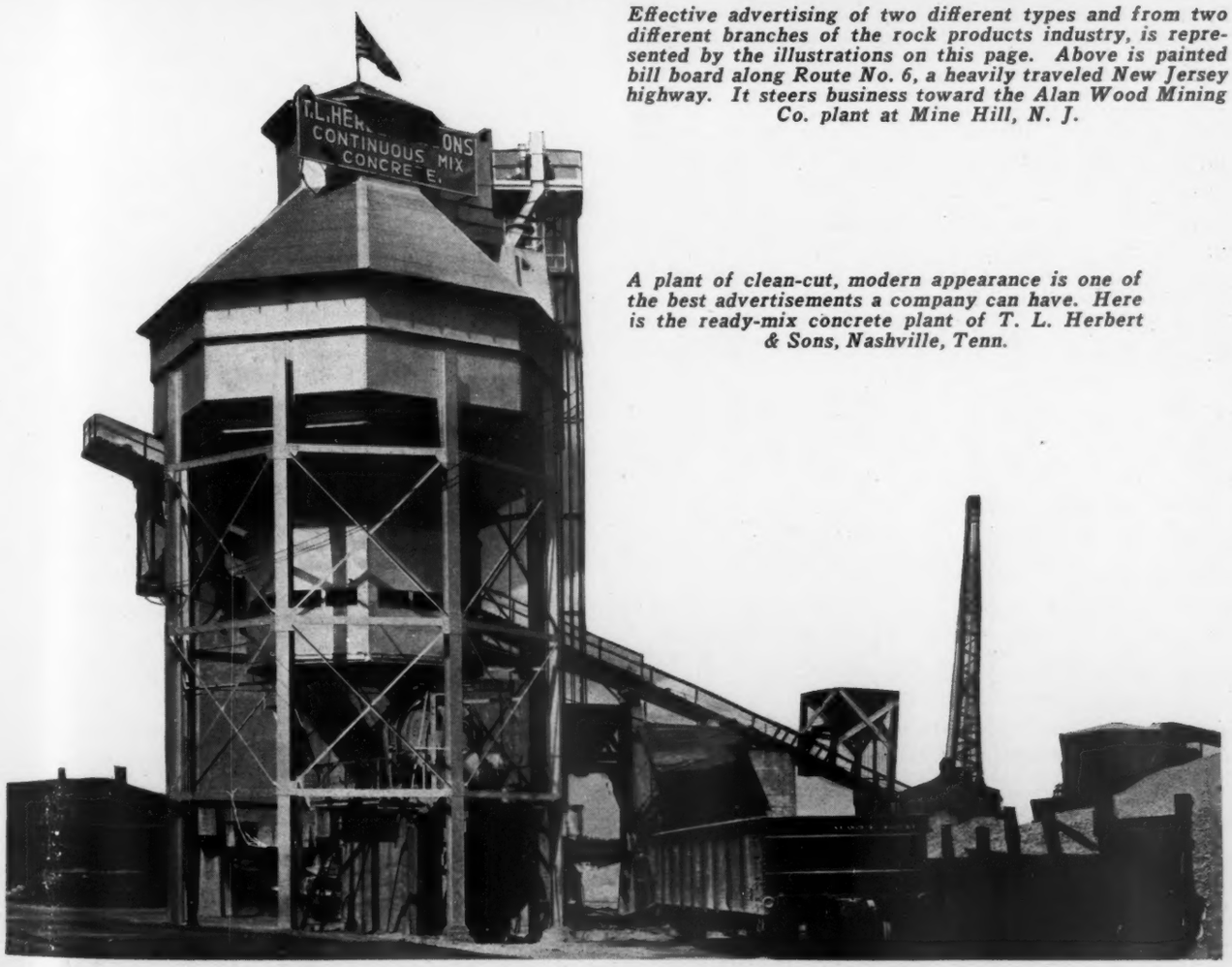
Sectional view of one of a unit recuperator installation



Sectional view of one of a unit recuperator installation



Effective advertising of two different types and from two different branches of the rock products industry, is represented by the illustrations on this page. Above is painted bill board along Route No. 6, a heavily traveled New Jersey highway. It steers business toward the Alan Wood Mining Co. plant at Mine Hill, N. J.



A plant of clean-cut, modern appearance is one of the best advertisements a company can have. Here is the ready-mix concrete plant of T. L. Herbert & Sons, Nashville, Tenn.

Producers Discuss Portable Plants (*Cont'd from Page 63*)

Forced into this field by contractor-producers and by the activity of county and state highway authorities prospecting and developing or offering local pits to contractors. The average contractor would rather buy. Producers are being forced to a hook-up or working arrangements with such contractors. Tendency here is toward portable production."

Mississippi: "In our particular territory I believe the permanent plant operator will either change to portable plants or go out of business. Developments in road building have favored the use of roadside materials to that extent. The commercial producer probably can best meet this competition by a combination of both fixed and portable plant operation as many contracts are too small to justify setting up a portable and can be economically supplied from a permanent plant. I believe the contractors would rather buy than produce aggregates."

Kansas: "We have a portable outfit and have used it on two set-ups, but made no money. Without this portable production we would have been altogether idle. Contractors threaten portable production and unless they buy at cost of production or less they actually do produce."

Texas: "The order of the day is changing for the producer, the same as for the railways. A producer will have to develop, for his territory, a portable or semi-portable unit, if he wants to stay in business. We have used semi-portable plants for years. The average contractor would rather buy his materials—especially after the mortality of contractor producers became so high. I do not think the producer will have to turn contractor, if he will stay awake and plan for the future."

Missouri: "Portable plant operation should be a legitimate activity for the commercial producer where there is a real saving and where a practicable operation is possible. We started out as a portable producer in 1924, but we don't like it. There are very few examples of continued success where contracting and producing aggregates is combined, but many examples of failures. Nevertheless, the established producer may be required to go into the contracting business to protect his own interests."

Crushed Stone: About the same proportion of crushed stone producers as of sand and gravel producers favor the use of portable plants when and where necessary —that is about 50%. While portable sand and gravel plants are most common in the West, portable rock crushing plants are probably more common in the East. However, both types of plant usually compete with established crushing plants for secondary highway material.

Georgia: "We believe that in some instances operation of portables by commercial producers is legitimate—in isolated sections. We know that the problem has been made more pressing through use of relief and convict labor, but the larger part of the tonnage lost by commercial producers to portables has been due to high freight rates. Believe the best policy is to join with some reputable portable plant operator, and in this way not add to the competition, and still be able to trade with contractors for shipments either from roadside portables or established plant."

Missouri: "As a commercial producer I started four years ago with one portable, and now have seven. My large fixed plants have not made money; without exception, every portable has made money. Have produced 700,000 tons with portables. As both a fixed and portable plant operator, I feel that both can function for farm-to-market roads. Every producer will be compelled to bid on the material bladed in on the road. I have been doing that for two years and have taken more than my share of the business and at better prices."

Iowa: "It is getting to the point where, in a large amount of public work, specifications have been changed to permit portable plants to furnish an inferior product in order to bring down the cost. It looks as though fixed plant owners may have to equip themselves with portables to get some of this business."

Pennsylvania: "Portable plants do not bother us except when operated by relief labor. The FERA is now spending $800,000 on a flood prevention project which calls for 45,000 tons of rip rap. While our plant is located only a few city blocks from the job and we could supply a better grade of stone at 75c per ton, loaded on trucks, the FERA plans to go six miles out into the hills with its relief labor to pick up and load the stone. Our quarry will have to close, laying off the men on our regular payroll."

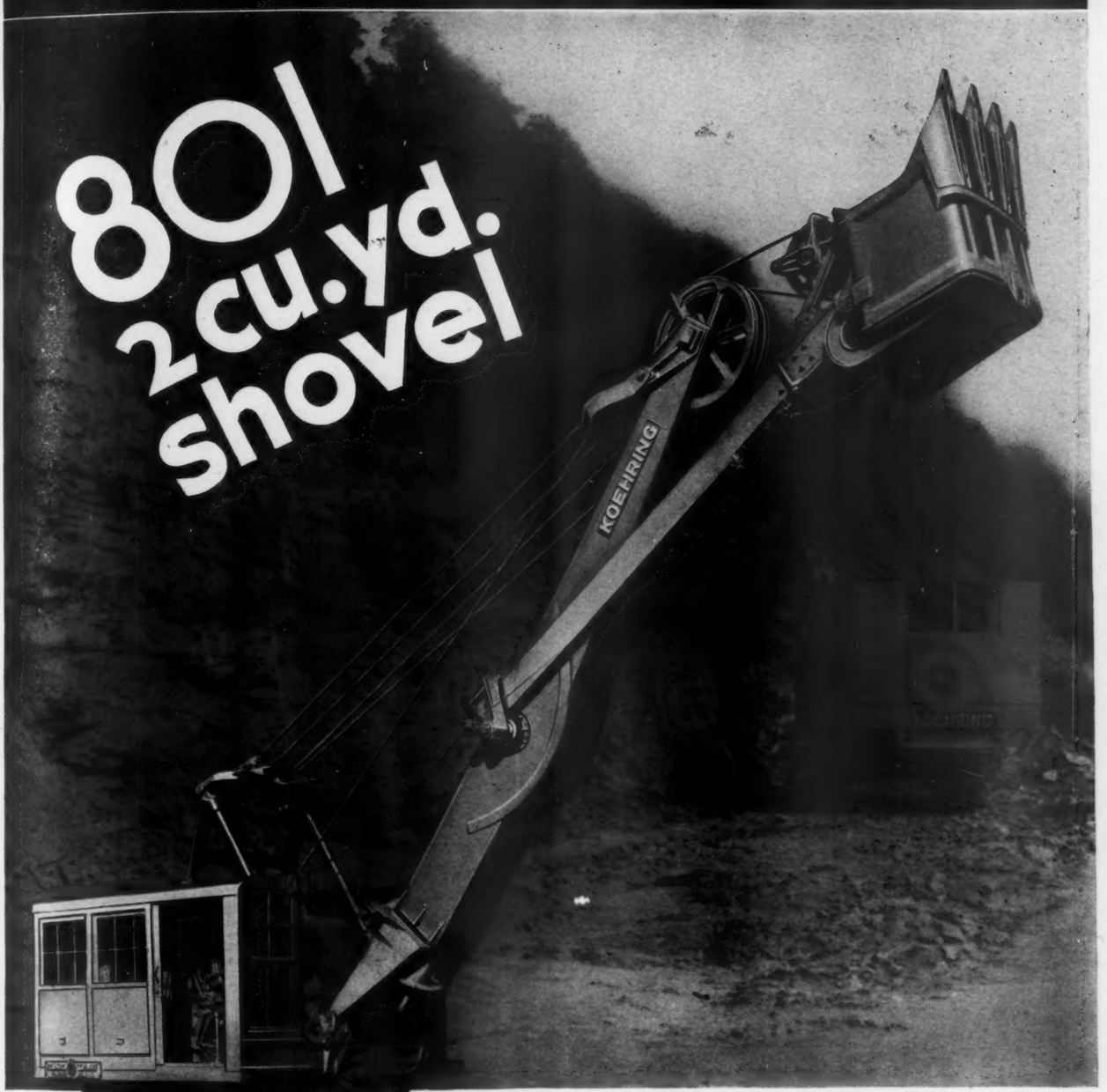
Pennsylvania: "In 1933 and 1934, on a CWA road job, the stone base cost between 80 and 84c. per sq. yd. I would have put the base in for 30c. per sq. yd. The material the CWA used was of very questionable quality, whereas mine is tested and of specified quality."

Ohio: "The salvation of the crushed stone industry is to bring motor truck rates under government supervision in the same manner as railway rates are supervised by the Interstate Commerce Commission."

Oklahoma: "Gradually the stationary plant producers will reach the conclusion that they must have one or more portable plants in order to protect their business, now so seriously threatened by producer contractors. There will be an increasing number of such producers, who will become contractors too, because of the tendency on the part of contractors to become producers. High-pressure machinery promotion will continue to make monkeys of all."

Georgia: "The average contractor would rather buy than produce his aggregates for most of them have been 'burned' at some time or other trying their own inexperienced hands at producing. The competition can best be met by established producers having both kinds of operation, for portable plants are well justified on a cost basis in some localities."

KOEHRING



The New Koehring 801 Shovel

— is convertible to crane or dragline — furnished with gasoline, diesel, oil or electric power—independent and positive, chain or cable crowd — sturdy, high strength welded shovel boom — Koehring hydraulically cushioned clutch and the exclusive Koehring boom foot shock absorber . . . For more details and specifications—

write for the new 801 bulletin.

KOEHRING HEAVY DUTY

KOEHRING COMPANY

MILWAUKEE *Division of National Equipment Corporation* WISCONSIN

The CONVEY-o-WEIGH *at the Alpha Plant* Cementon, N. Y.

One of the most interesting features of the modernized Alpha plant at Cementon, N. Y., is the Richardson CONVEY-o-WEIGHS for proportioning the stone and clay to the mill. This combination receives the stone and clay from the chain drag and a set charge of 500 lbs. of stone is delivered while the clay may be varied to meet the percentage required. Or the Stone Scale may be operated alone if required. Hourly capacity is up to 45 tons.

There is a continuous feed of accurately proportioned materials to the mill. Variable speed motors on the units are controlled by rheostats which can, of course, be manually regulated to increase or decrease the speed of delivery of proportioned materials. In addition to this, the quantity of materials delivered to the mill is increased or decreased *automatically* and electrically according to the load on the mill motor. Thus the combination automatically keeps pace with the requirements of the grinding mill.

The CONVEY-o-WEIGH is in service weighing and proportioning many other materials such as clinker, gypsum, cement, bauxite, slag, barytes, coal, coke breeze, sand, clay, limestone, etc.

Write for full particulars.

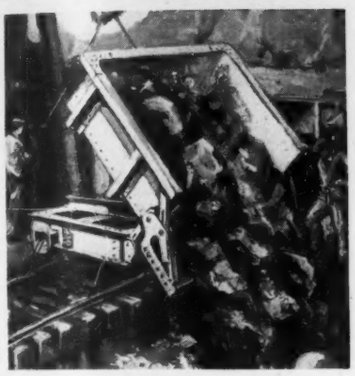
RICHARDSON SCALE COMPANY

CLIFTON **NEW JERSEY**

EASTON EFFICIENCY EQUIPMENT

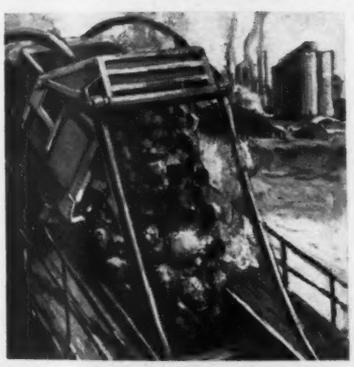
Phoenix Car

Phoenix Body



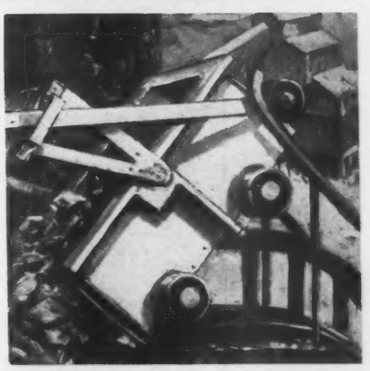
Wonway Car

Wonway Body



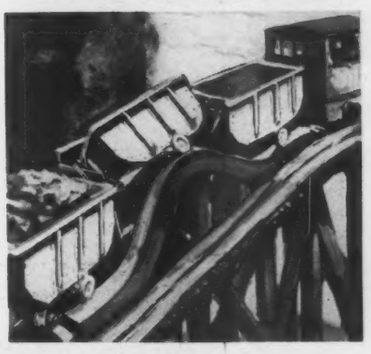
Rear Dump

Front Dump



Rocker Car

Granby Car



EASTON CAR & CONSTRUCTION CO.

EASTON, PENNA.

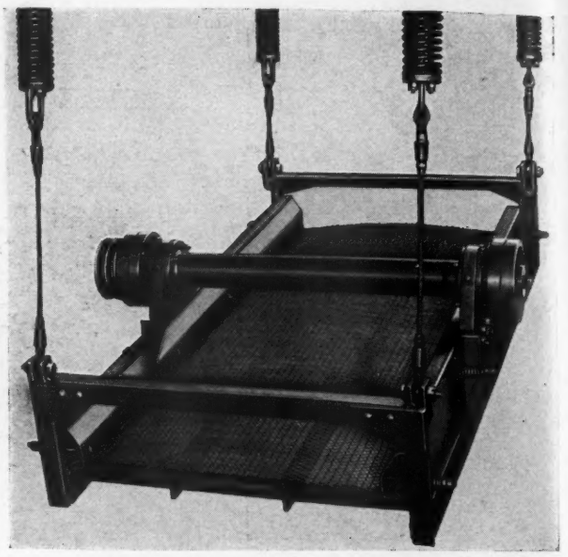
Two Types of Screens

.... *which do you need in your plant?*

ALLIS-CHALMERS vibrating screens are available in two types . . . in sizes suitable for every plant. They are used for sizing crushed stone, slag, ore, sand and gravel, coal and coke, wood chips, commercial fertilizer, in fact, nearly all kinds of materials sized for commercial purposes, either wet or dry.

Aero-Vibe Screens

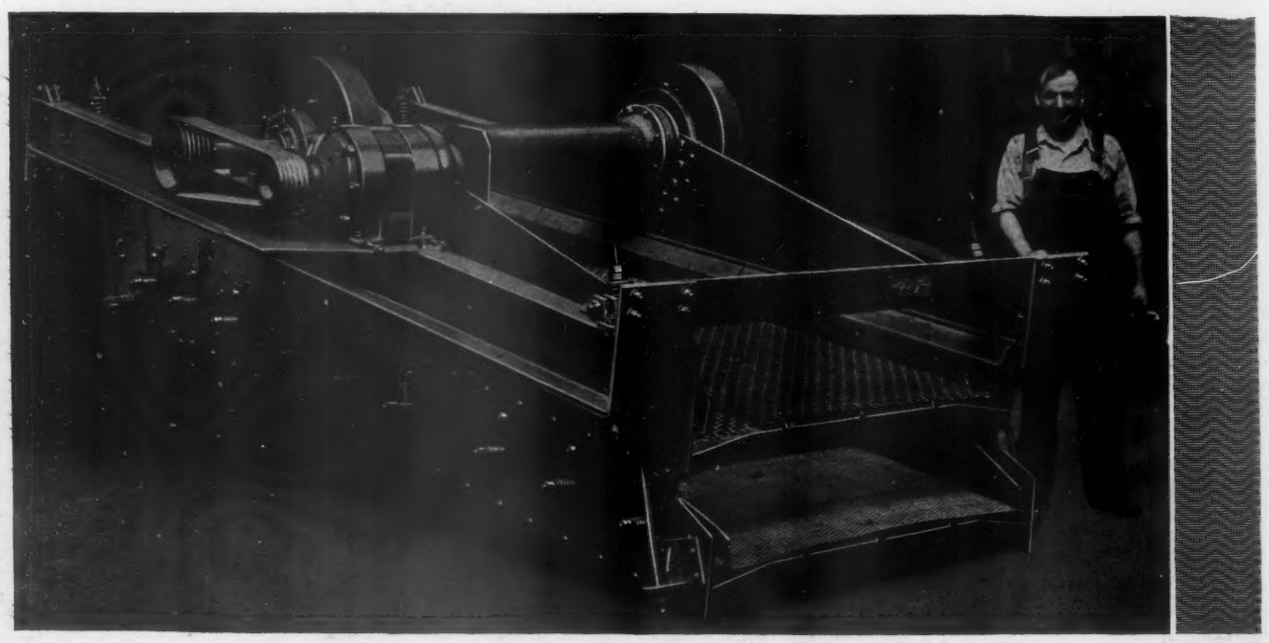
The "Aero-Vibe" screen "floats in the air" suspended from the supporting structure by cables and springs. A rapid, adjustable, vibrating motion is produced by counterweighted wheels mounted on the drive shaft supported in anti-friction bearings above the screen body or vibrating member. Single and double deck "Aero-Vibe" screens are available from 1½ x 3 ft. to 4 x 10 ft. sizes for handling medium to fine size materials, and for limited tonnage.



3'x6' Single Deck Aero-Vibe Screen

Centrifugal Vibrating Screens

Style "B" Centrifugal screens are built with one, two, or three decks in sizes from 2 x 6 ft. to 5 x 14 ft. and are adaptable for heavy loads and the maximum range of material size. The screening action, which is equally intense for all tonnages, is transmitted to the screen body or vibrating member by an eccentric shaft located above the screen and supported in anti-friction bearings. The screen body "floats" on balance springs reducing power and the load on the bearings; the entire screen is cable and spring suspended.



5'x14' Double Deck Style "B" Centrifugal Vibrating Screen

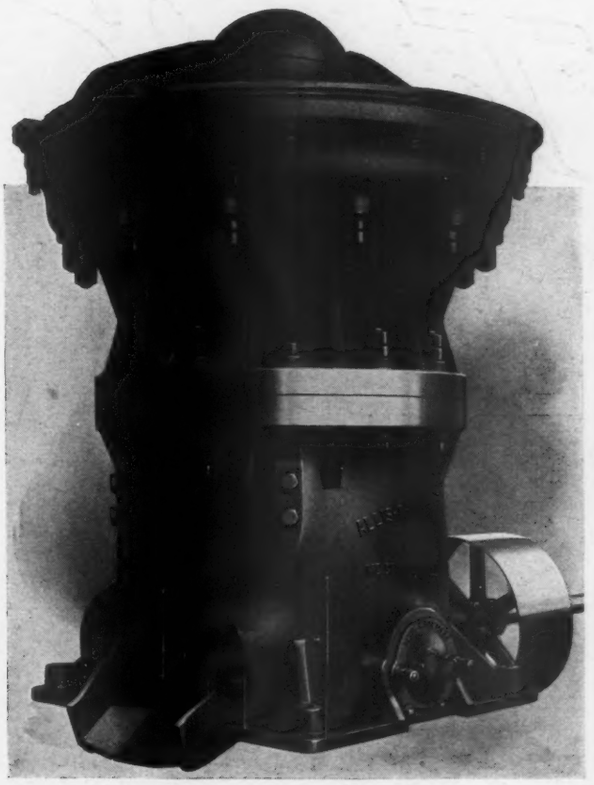
ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

The Type of Crusher
. . . . *to Suit Your Needs*

ALLIS-CHALMERS MANUFACTURING COMPANY has developed a line of crushing plant machinery which, with study and selection, will meet every possible combination of the varying factors of crushing plant operation in the most economical manner. As manufacturers of gyratory, jaw and roll type crushers, Allis-Chalmers is in a unique position; not being primarily interested in pushing the sale of any one of these types in preference to the others, our primary interest is always to help our customers solve their rock crushing problems in the most economical way.

Newhouse Crusher



36″ Superior McCully Crusher

TWO types of Allis-Chalmers crushers are illustrated here. The Superior McCully type (above) is the original short, heavy shaft gyratory greatly improved by constant development. The crusher is of rugged construction to withstand severe service. The lubricating system is simple and reliable and the eccentric dust seal is of an improved design. Built in many sizes from 8″ to 60″. (*Described in Bulletin 1472.*)

The Newhouse Crusher (left) meets every requirement of secondary crushing. It is a high reduction, large capacity unit with motor direct connected to drive shaft, and is well suited to fit into present installations. It requires little head room and may be suspended from the frame work of a building by cables. Built in four sizes, 5″, 7″, 10″ and 14″. (*Described in Bulletin 1469-C.*)

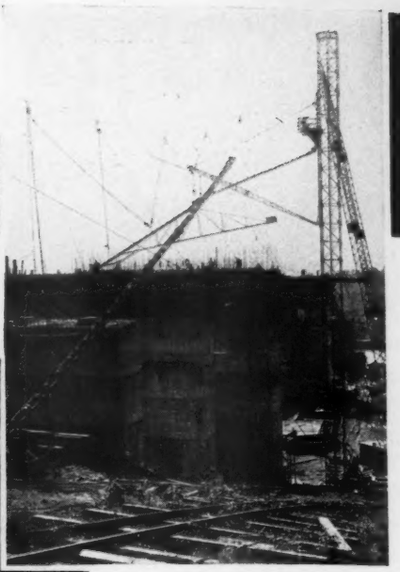
Bulletin 1473, just printed, describes the complete Allis-Chalmers line of crushing plant machinery. Write for your copy.

ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

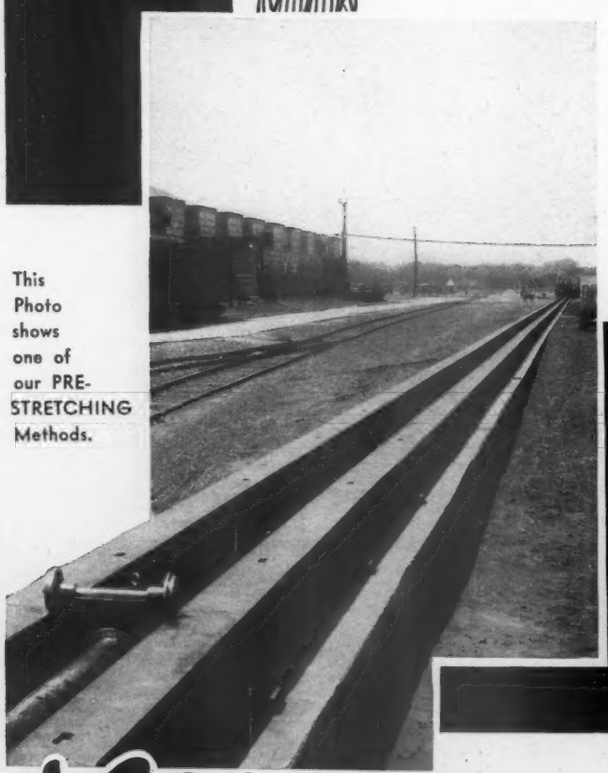
Let's Get Together

and study with you



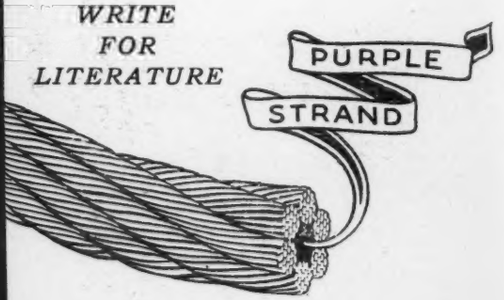
YOUR WIRE ROPE PROBLEMS

By reason of the vast technical experience we have compiled in relation to the use of ropes of proper construction in various operations, we may be of great help to you in the economical operation of equipment that may now be causing you trouble and excessive expense.



This Photo shows one of our PRE-STRETCHING Methods.

WRITE FOR LITERATURE



Williamsport

WIRE ROPE COMPANY

Main Office and Works, WILLIAMSPORT, PENNA. *Branch Sales Offices:* 122 S. Michigan Ave., Chicago

MODERNIZE TO ECONOMIZE

•

This is an opportune time to modernize, to lower the cost of production and improve the quality of product, by the utilization of MODERN

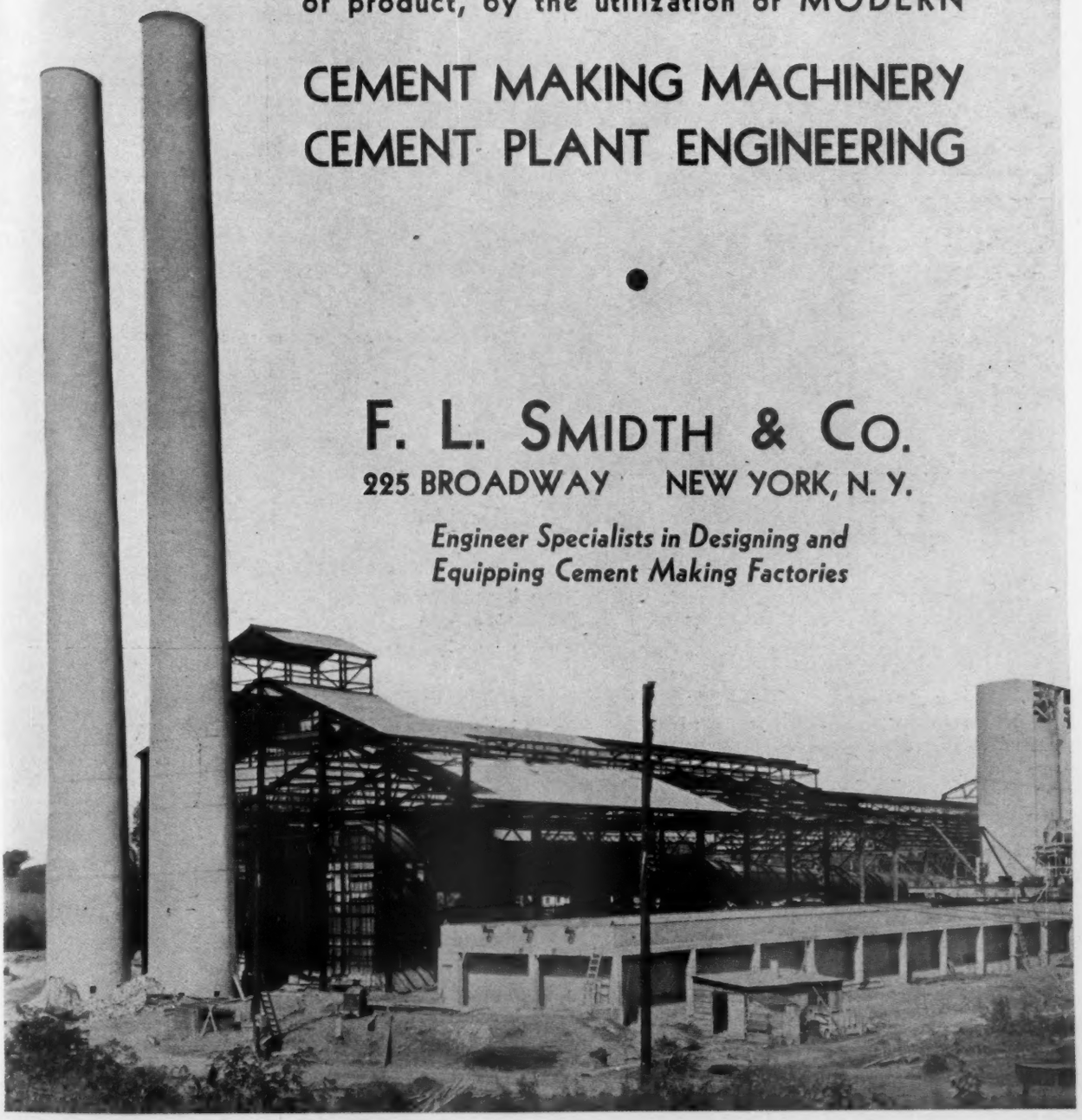
CEMENT MAKING MACHINERY
CEMENT PLANT ENGINEERING

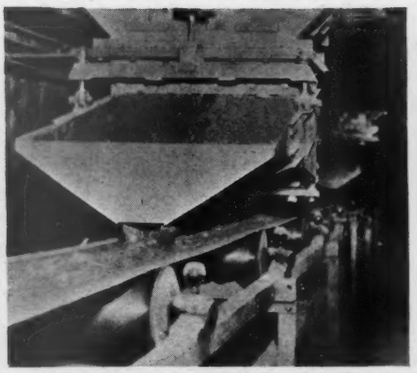
•

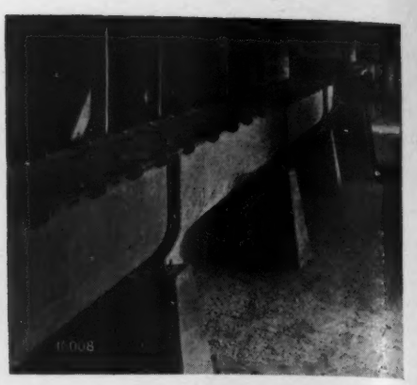
F. L. SMIDTH & CO.

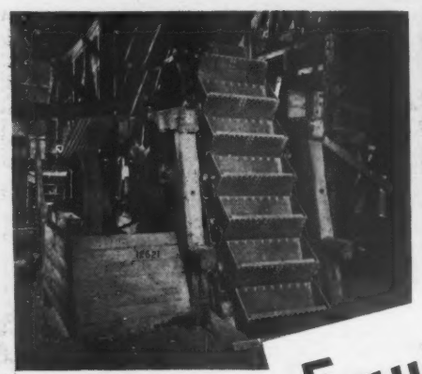
225 BROADWAY NEW YORK, N. Y.

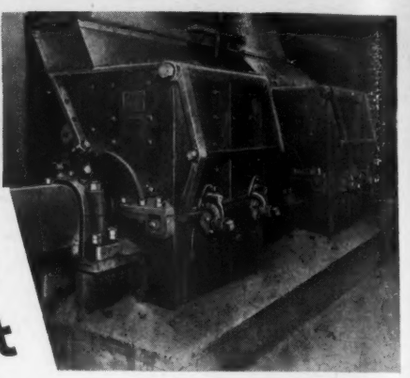
Engineer Specialists in Designing and Equipping Cement Making Factories











Equipment with a Reputation—to Cut those Costs—It's JEFFREY

If you have a material handling or reduction job of any kind—and want it done quickly and economically—there is a right Jeffrey Unit to do that job correctly without forcing the application of any type.

All kinds of bulk material including: stone, gravel, sand, cement, lime, gypsum and similar products are being elevated, conveyed, screened, washed, or reduced to any desired size . . . by Jeffrey Equipment.

Our Jeffrey Engineers will be glad to solve your handling and reduction problems. And you can rely on recommendations by Jeffrey. Write today.

The Jeffrey Manufacturing Company

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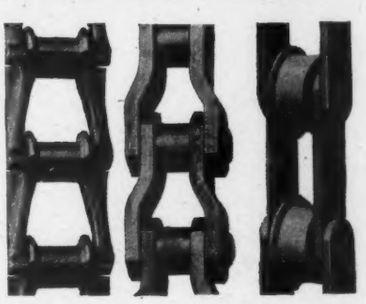
New York Philadelphia Scranton, Pa. Cleveland Milwaukee Birmingham
Buffalo Pittsburgh Cincinnati Chicago Denver Dallas
Rochester, N. Y. Boston Detroit Huntington, W. Va. Salt Lake City

Jeffrey Manufacturing Company, Ltd., of Canada
Head Office and Works, Montreal
Branch Offices, Toronto—Calgary—Vancouver



Jeffrey Products:

Elevators and Conveyors
Electric Vibrating Conveyors, Screens, Feeders
Crushers, Pulverizers
Portable Loaders
Sand Settling Tanks
Sand and Gravel Handling Machinery
Washing and Screening Equipment
Coal and Ashes Handling Machinery
Locomotives Chains and Attachments
Sprocket Wheels Gears

JEFFREY

YOU *are entitled to know and you should be interested in knowing*

AFTER all, the keel of any publication soundly built, is reader interest. It is our purpose to give you, here, the 1935 editorial viewpoint and intentions of ROCK PRODUCTS. This, so that you may know what is being done to maintain and further heighten the buoyancy of reader interest.

During the years of the industry's deep depression ROCK PRODUCTS especially treated problems and methods of management. That was because plant owners were wrestling primarily with such angles of business.

There was the omnipotent NRA—the ever busy Code Authorities—and numerous varieties of business 'readjustments. To examine the structures and working of these strange creatures for editorial discussion meant trips to Washington—to code-authority meetings, committee assemblages—and allied activities.

With 1934 ending and handing out a final re-cap' of 30% increase in production, and with prospects of a fair year in 1935, readers' interest turns once more to problems of operation, rehabilitation and method-modernizing.

ROCK PRODUCTS' editorial staff is being increased so that a broadened editorial work can be efficiently and effectively handled. Under Editor Rockwood's supervision, the country will be combed for plant developments and progress. All that is of interest and value to ROCK PRODUCTS' readers will be searchingly examined and intelligently explained in detail.

ROCK PRODUCTS has refused to indulge in empty editorial gestures for the purpose of impressing advertisers. It has been careful to maintain the respect of its subscribing clientele—plant owners—by publishing a true portrayal of industrial conditions. It has not offended its readers by presenting pap and piffle. ROCK PRODUCTS' readers represent—above all—that element of the industry which cannot be satisfied by elemental plant "write-up" presentations.

ROCK PRODUCTS regards its policy as fully endorsed by plant owners because those men have seen fit—even in the tough times of the past—to continue to pay $2 per year for ROCK PRODUCTS and rightfully to regard that price as a first-class investment.

That policy has endured the acid test of competitive subscription prices sliding downward to $1 and even to 50c per year's subscription!

The rock products industry's numerical strength, from the standpoint of number of BUYERS of equipment and supplies, is confined to a few thousand individuals who account for normal-year expenditures of from seventy-five to one hundred million dollars.

It is these individuals whom manufacturers want to influence—the readers of ROCK PRODUCTS. This fact generally is appreciated. It accounts for ROCK PRODUCTS' long-standing advertising leadership.

And now, for 1935, ROCK PRODUCTS' Editor-in-Chief, N. C. Rockwood, surveys a fast-reviving industry. He promises that this twelve-month will be invested in a thorough-going study of successful operations. He's going to dissect them to discover what makes them "tick" efficiently and profitably.

What's worth-while will be intelligently reported in the brilliant 1935 issues of this top paper.

As to the circulation of that information: It will be disseminated through as many copies of ROCK PRODUCTS as is necessary to effect a complete distribution of the editorial findings. But there will be no theatrical moves in the direction of circulation quantity. ROCK PRODUCTS' money as always will be spent for quality, since the really-effective producing capacity of the industry does not call for a large distribution. ROCK PRODUCTS' 5,500 copies per month represent an ample numerical abundance.

Printing presses cannot manufacture prospects. Thinking advertisers realize this and will appreciate ROCK PRODUCTS' continuation of faithful emphasis upon good editorial matter.

Wheel into action and participate in the lusty 1935 need for equipment and supplies!

Rock Products

With which is consolidated CEMENT and ENGINEERING NEWS Founded 1896

330 S. WELLS STREET, CHICAGO

ROCK PRODUCTS 1935 Editorial Plan

I'll meet you 'feller's in Chicago!

JANUARY 27-28-29-30-31
and FEBRUARY 1, 1935

Biggest Event in the History of the Mineral Aggregate Industries

CONCURRENT ANNUAL CONVENTIONS

National Crushed Stone Association
National Sand and Gravel Association
National Slag Association

Second Annual Meeting of the National Code Authority

of the Crushed Stone, Sand and Gravel, and Slag Industries

INDUSTRIAL PROGRESS EXHIBIT

of the combined Manufacturers' Divisions
of the National Crushed Stone Association
and the National Sand and Gravel Association.

Write to the

PALMER HOUSE, CHICAGO, ILL.

for room reservations.

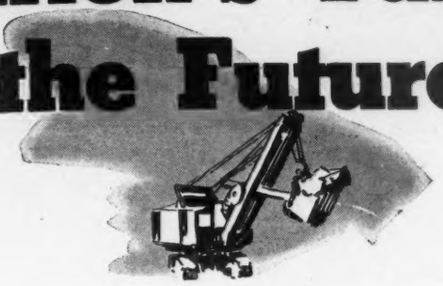
For Full Details in regard to Exhibit Space—Available to non-members as well as members of the Manufacturers' Divisions.

Write to

NATIONAL CRUSHED STONE ASSOCIATION or NATIONAL SAND AND GRAVEL ASSN.

Munsey Building, Washington, D. C. Munsey Building, Washington, D. C.

Marion's Faith in the Future



FOUR YEARS AGO

the Power Shovel Industry faced the most serious period in nearly fifty years. The situation was universal in its effect » » not a single business, industry or individual escaped.

To most industries this suggested retrenchment » » the curtailing of activities » the retarding of engineering development » the severing of long established associations » the complete abandonment of accepted plans and policies.

Marion faced this period courageously, for it meant the dawn of a new era. Marion realized that to survive and maintain its leadership would require extraordinary vision, the exercise of rare judgment, the building of better and more efficient machines, and the application of sounder business principles than ever before.

Thus, Marion charted its course.

The needs of the excavator industry were surveyed and fully determined » users of all sizes and types of machines were consulted » working problems were analyzed » » all for the purpose of maintaining Marion's position as the creator and builder of power shovels recognized as the standard for the entire industry.

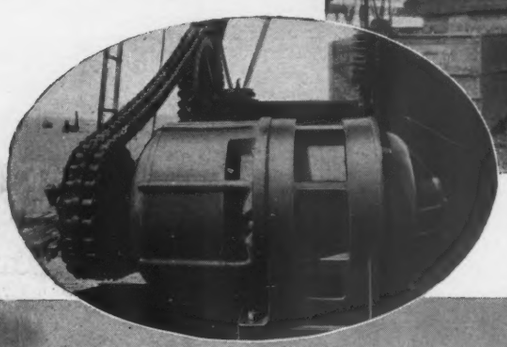
New machines were designed, others were improved, some were abandoned » » the entire Marion line was made complete and thoroughly modern. Every bit of energy and every facility within the Marion organization » » whether engineering, manufacturing, testing, marketing or servicing » » were dedicated to the one idea of building and introducing the new and complete line of Marion excavators.

Now, after four years, the soundness and far-sightedness of this policy have been proven. Acceptance of this new line has been most generous. In every locality these new and improved Marions have appeared. Naturally, Marion is proud of this achievement and the dominant position it enjoys in all the basic industries and on all the large construction projects started during the past few years.

Today, more than ever before, Marion has greater faith in the future, greater faith in its products and its ability to serve, and greater faith in the opportunities that are offered to the users of excavating equipment.

THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A.

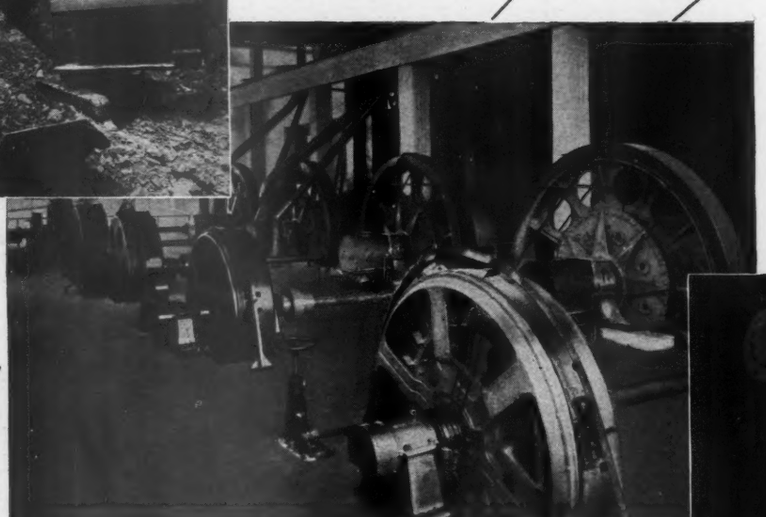
If you need a dependable low-speed motor that can be connected directly to your kiln or cooler gears, conveyors, car pullers, feeders, etc., use a G-E gear-motor. They are compact low-speed drives that deliver their full-rated power at the output shaft at almost any speed from 13 to 600 rpm.



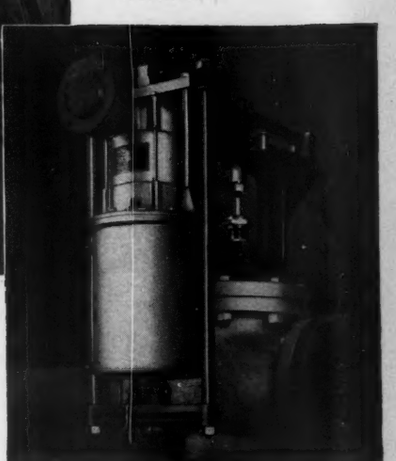
For all motors and control, be sure to see General Electric first. From our complete line, we can supply the RIGHT MOTOR and the RIGHT CONTROL for every drive in the rock products industry. Remember, perfectly matched motors and control promote greater economy

FOR EVERYTHING ELECTRIC

For cable, too, see G.E. Most of your jobs, especially electric shovels, need tough cable. For this service, G-E Tellurium-compounded cable has proved its worth. We can supply cable of every type, size, and voltage for use about your plant



NRA MEMBER U.S. WE DO OUR PART



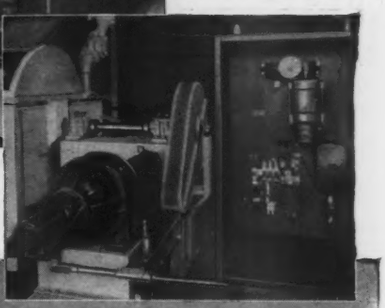
For driving tube mills, use the G-E Super Synchronous motor. Synchronized before its load is started, this motor will accelerate unusually heavy loads smoothly, and synchronize them without excessive demands on the power supply or stress on mechanical equipment

To handle slurry, steam, gas, water, oil, etc., quickly and easily by remote control, use a G-E Thrustor valve—a superior valve operated by a Thrustor. In cement, amesite, or ready-mix plants, they provide the best means of automatically proportioning the raw materials.

G E N E R A L

In modernizing your plant, use G-E shipped-assembled switchgear. Each unit comes completely wired, ready for installation. Consider the saving! G.E. makes a complete line of switchgear and control for your every need

If you want to synchronize two or more drives, such as the kiln with its feeder, a number of conveyors, or other related units, use G-E Selsyn devices. Ask a G-E sales engineer to tell you more about this important modernization tool



Here's a G-E photoelectric relay automatically weighing the ingredients in a ready-mix batching plant. There are dozens of other jobs that "electric eyes" can do with new economy and efficiency. Write for a copy of *G-E Photoelectric Relays*, GEA-1654A

SEE GENERAL ELECTRIC

SEE General Electric first! There you can buy, from a dependable manufacturer, all the electric equipment you need for a modern rock products plant, on one order blank.

General Electric can meet every need with dependable equipment, progressive engineering, and prompt, competent service.

Not the least of these is service—reliable, matched G-E renewal parts are available for an emergency. Conveniently located service shops and warehouses and reliable G-E sales offices are at your service and are always ready to help you to the most economical solution of your problems.

Illustrated on this page are a few of the many time- and money-saving equipments in our extensive rock products line—equipments that will stay on the job, year after year, with G-E reliability. If you would like additional information on any of these items, please write or call the nearest G-E office, or General Electric, Dept. 6C-201, Schenectady, N. Y.

For rotary cement kilns, coal conveyors, chain-grate stokers—wherever you need an efficient, adjustable-speed drive with good speed regulation—use a BTA motor. With it, you can obtain directly from an a-c. source the most desirable characteristics of a d-c. shunt motor. Send for bulletin GEA-712B

020 1

E L E C T R I C

Classified Directory of Advertisers in this Issue of Rock Products

For alphabetical index, see page 2

This classified directory of advertisers in this issue is published as an aid to the reader. Every care is taken to make it accurate, but ROCK PRODUCTS assumes no responsibility for errors or omissions. The publishers will appreciate receiving notice of omissions or errors, or suggestions

Acetylene Welding Rod
American Steel & Wire Co.

Agitating Ladders (Dredge)
Pettibone Mulliken Co.

Agitators, Thickeners and Slurry Mixers
Hardinge Company, Inc.
F. L. Smidth & Co.

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Co.
Gardner Denver Co.
Ingersoll-Rand Co.
Nordberg Mfg. Co.
Traylor Eng. & Mfg. Co.

Air Filters
Fuller Co.

Air Pumps
Ingersoll-Rand Co.

Air Separators
Hardinge Company, Inc.
Lime & Hydrate Plants Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Automatic Weighers
Merrick Scale Mfg. Co.
Richardson Scale Co.

Axles
Easton Car & Const. Co.

Babbitt Metal
Joseph T. Ryerson & Son, Inc.

Backdiggers
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Company, Inc.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Bagging Machinery
Richardson Scale Co.

Bags
Chase Bag Co.

Ball Bearings
S K F Industries, Inc.

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
F. L. Smidth & Co.

Bar Benders and Cutters
Koehring Co., Division of National Equipment Corp.

Batchers
Fuller Company

Bearings
Chain Belt Co.
Link-Belt Co.
Joseph T. Ryerson & Son, Inc.
S K F Industries, Inc.
Timken Roller Bearing Co.

Bearings (Anti-Friction)
S K F Industries, Inc.
Timken Roller Bearing Co.

Bearings (Roller)
S K F Industries, Inc.
Timken Roller Bearing Co.

Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
S K F Industries, Inc.
Timken Roller Bearing Co.

Belting
Robins Conveying Belt Co.

Bin Gates
Chain Belt Co.
Easton Car & Const. Co.
Fuller Co.
Good Roads Machy. Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Traylor Eng. & Mfg. Co.

Bins
Austin-Western Road Machy. Co. (Sand and Gravel)
Blaw-Knox Co.
Good Roads Machy. Corp.
Pioneer Gravel Equip. Mfg. Co. (Steel)
Traylor Eng. & Mfg. Co.

Blocks (Pillow, Roller Bearing)
Link-Belt Co.
S K F Industries, Inc.
Timken Roller Bearing Co.

Blocks (Sheave)
American Manganese Steel Co.

Boilers
Babcock & Wilcox Co.

Breakers (Primary)
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Briquetting Machinery
Vulcan Iron Works

Buckets (Dragline and Slackline)
American Manganese Steel Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Pioneer Gravel Equipt. Mfg. Co.
Wellman Engineering Co.

Buckets (Elevator and Conveyor)
Chain Belt Co.
Cross Engineering Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pettibone Mulliken Co.
Pioneer Gravel Equipt. Mfg. Co.
Robins Conveying Belt Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Hayward Company
Industrial Brownhoist Corp.
Link-Belt Co.
Pettibone Mulliken Co.
Wellman Engineering Co.

Bulldozers
Blaw-Knox Co.
Koehring Co., Division of National Equipment Corp.

Cableways
American Steel & Wire Co.
General Electric Co.
Link-Belt Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Calciners
Vulcan Iron Works

Car Pullers
Link-Belt Co.
Robins Conveying Belt Co.

Carriers
Barber-Greene Co.

Cars (Dump)
Easton Car & Const. Co.

Cars (Quarry and Gravel Pit)
Austin-Western Road Machy. Co.
Easton Car & Const. Co.

Castings
Babcock & Wilcox Co.
Eagle Iron Works (Grey Iron)
Link-Belt Co.
McLanahan & Stone Corp.
Pettibone Mulliken Co.
Timken Roller Bearing Co.
Vulcan Iron Works

Cement Making Machinery
Allis-Chalmers Mfg. Co.
F. L. Smidth & Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Cement Waterproofing
Wyodak Chemical Co.

Central Mixing Plants
Blaw-Knox Co.
Chain Belt Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Chain Belt Co.
Link-Belt Co.
Pettibone Mulliken Co.

Chain Drives
Chain Belt Co.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chutes and Chute Liners
American Manganese Steel Co.
Cross Engineering Co.
McLanahan & Stone Corp.

Chutes for Minimizing Segregation
Robins Conveying Belt Co.

Classifiers
Link-Belt Co.

Clips (Wire Rope)
American Steel & Wire Co.
Williamsport Wire Rope Co.

Clutches
Fairbanks, Morse & Co.

Coal Crushers and Rolls
Austin-Western Road Machinery Co.
McLanahan & Stone Corp.
Vulcan Iron Works
Williams Patent Crusher & Pulv. Co.

Coal Pulverizing Equipment
Babcock & Wilcox Co.
Hardinge Company, Inc.
Pennsylvania Crusher Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Compressed Air Rock Drills
Gardner-Denver Co.

Compressed Air Hoists
Gardner-Denver Co.

Compressors (See Air Compressors)

Concrete Breakers (Pneumatic)
Ingersoll-Rand Co.

Concrete Slab Raising Equipment (Mud-Jack)
Koehring Co., Division of National Equipment Corp.

Condensers
Ingersoll-Rand Co.

Controllers (Electric)
Fairbanks, Morse & Co.

Conveyor Idlers and Rolls
Barber-Greene Co.
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.

Conveyors and Elevators
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Barber-Greene Co.
Chain Belt Co.
Fuller Company
Good Roads Machy. Corp.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Gravel Equipt. Mfg. Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Pneumatic)
Fuller Company

Conveyors (Screw)
Link-Belt Co.

Conveyors (Shaking Chute)
Vulcan Iron Works

Conveyoweighs
Richardson Scale Co.

Coolers (See Kilns and Coolers, Rotary)

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Link-Belt Co.

Couplings (Hose, Pipe, etc.)
Ingersoll-Rand Co.

Cranes (Clamshell)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Koehring Co., Division of National Equipt. Corp.

Cranes (Crawler and Locomotive)
Austin-Western Road Machy. Co.
Bay City Shovels, Inc. (Gasoline, Electric, Diesel)
Bucyrus-Erie Co.
Industrial Brownhoist Corp.
Koehring Co., Division of National Equipt. Corp.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Link-Belt Co.
Marion Steam Shovel Co.

Cranes (Excavator
Koehring Co., Division of National Equipt. Corp.

Cranes (Overhead Traveling Electric)
Industrial Brownhoist Corp.

Crusher Parts
American Manganese Steel Co.
American Pulverizer Co.
Pennsylvania Crusher Co.
Pettibone Mulliken Co.

Crushers (Hammer)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Dixie Machy. Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

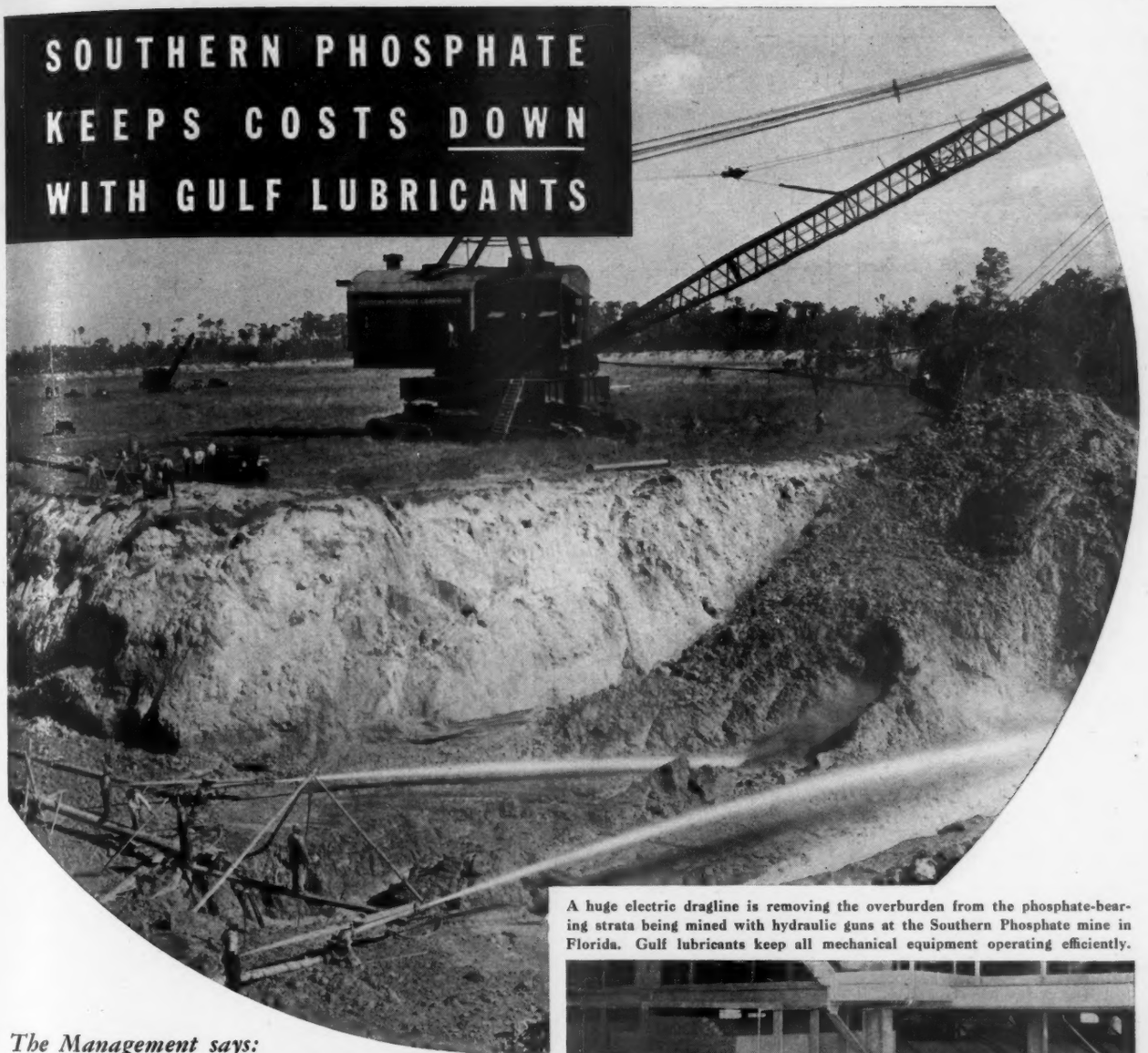
Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon, Inc. (Jaw))
Good Roads Machy. Corp. (Jaw)
Lewistown Fdy. & Mach. Co.
Lime & Hydrate Plants Co.
Nordberg Mfg. Co.
Pensylvania Crusher Co.
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Ring)
American Pulverizer Co.

Crushers (Rotary)
American Pulverizer Co.

Crushers (Single Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Gravel Equipt. Mfg. Co.
Williams Patent Crusher & Pulv. Co.

SOUTHERN PHOSPHATE KEEPS COSTS DOWN WITH GULF LUBRICANTS



A huge electric dragline is removing the overburden from the phosphate-bearing strata being mined with hydraulic guns at the Southern Phosphate mine in Florida. Gulf lubricants keep all mechanical equipment operating efficiently.

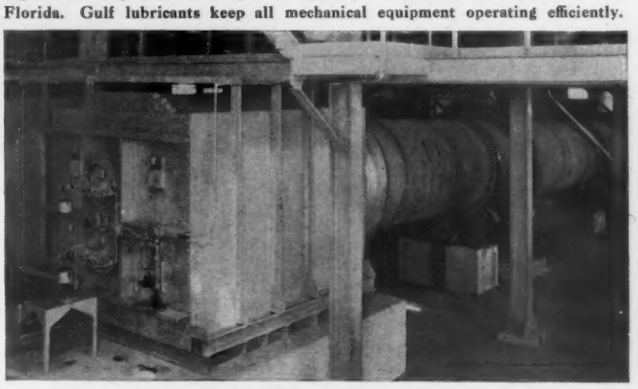
The Management says:

"We Use Gulf Lubricants for Ultimate Economy"

To protect their large investment in mining and processing equipment the Southern Phosphate Corporation has standardized on Gulf quality lubricants and engineering service.

In all branches of the rock products industry, leading plants are using Gulf lubricants to *reduce operating costs.*

Gulf will give you a definite lubrication plan designed to effect savings in maintenance, power and lubricants costs. Discuss this matter in detail with the Gulf engineer the next time he calls at your plant.



The drying plant, where two rotary drying kilns with a capacity of 2,500 tons per day prepare the phosphate for shipment. Gulf lubricants protect this heavy equipment from excessive wear and maintenance expense.

GULF REFINING COMPANY, PITTSBURGH, PA.

District Sales Offices:

Boston New York Philadelphia Atlanta New Orleans
Houston Pittsburgh Louisville Toledo

GULF INDUSTRIAL LUBRICATION

Gulf's technical staff will be pleased to give you advice or information regarding the lubrication of any and all of your equipment. Fill in and send the coupon. You will not be obligated.

GULF REFINING COMPANY R.P.-1
3800 Gulf Building, Pittsburgh, Pa.
I would like to have information regarding lubricants for.....

Name.....

Title.....

Company.....

Address.....

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Jeffrey Mfg. Co.
Pettibone Mulliken Co.
McLanahan & Stone Corp.
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.

Dedusters
Blaw-Knox Co.

Dipper Teeth
Pettibone Mulliken Co.

Dippers (Manganese Steel)
American Manganese Steel Co.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.
Marion Steam Shovel Co.
Pettibone Mulliken Co.

Dirt Moving Equipt. (Dumptor)
Koehring Co., Division of National Equipt. Corp.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Marion Steam Shovel Co.

Draglines
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.

Draglines (Gasoline or Electric)
Koehring Co., Division of National Equipt. Corp.

Dragline Excavators
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Marion Steam Shovel Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Dragline Cableway Excavators
Bucyrus-Erie Co.
Good Roads Machy. Corp.
Link-Belt Co.
Marion Steam Shovel Co.

Dragline Excavators (Walking)
Bucyrus-Monighan Company

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Marion Steam Shovel Co.
Morris Machine Works

Drill Bits
Ingersoll-Rand Co.
Timken Roller Bearing Co.

Drill Sharpening Machines
Ingersoll-Rand Co.
Gardner-Denver Co.

Drill Steel
Ingersoll-Rand Co.

Drills
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills (Core)
Ingersoll-Rand Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Ingersoll-Rand Co.
Gardner-Denver Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.
Fairbanks, Morse & Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Hardinge Company, Inc.
Lime & Hydrate Plants Co.
McLanahan & Stone Corp.
Ruggles Coles Division of Hardinge Co.
Traylor Eng. & Mfg. Co.
Vulcan Iron Works (Rotary)

Dumptors
Koehring Co., Division of National Equipt. Corp.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.

Dust Conveying Systems
Fuller Company

Electric Cables and Wires
American Steel & Wire Co.
John A. Roebling's Sons Co.

Electric Mine Hoists
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.
Fairbanks, Morse & Co.

Emery Mills
Sturtevant Mill Co.

Engineers
Kritzer Company
Lime & Hydrate Plants Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel)
Fairbanks, Morse & Co.
Ingersoll-Rand Co.
Nordberg Mfg. Co.

Engines (Kerosene, Gasoline and Oil)
Fairbanks, Morse & Co.

Engines (Steam)
Morris Machine Works

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Koehring Co., Division of National Equipt. Corp.

Excavators (Dragline)
Koehring Co., Division of National Equipt. Corp.

Fans
General Electric Co.
Vulcan Iron Works

Fans (Exhaust)
Jeffrey Mfg. Co.

Feeders
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co. (Pulverized Coal)
Chain Belt Co.
Fuller Co. (Cement and Pulverized Material)
Hardinge Company, Inc.
Jeffrey Mfg. Co. (Pan and Tube)
Robins Conveying Belt Co.
Schaffer Poidometer Co.
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works (Plate)

Flights
Cross Engineering Co.

Forges (Oil)
Gardner-Denver Co.

Frogs and Switches
Easton Car & Const. Co.

Fuses (Electrical)
General Electric Co.

Gears and Pinions
Chain Belt Co.
General Electric Co.
Link-Belt Co.
Pettibone Mulliken Co.
Vulcan Iron Works

Gears (Spur, Helical and Worm)
Jeffrey Mfg. Co.

Generating Sets (Diesel Elec.)
Fairbanks, Morse & Co.

Grapples (Stone)
Blaw-Knox Co.
Hayward Co.

Grease
Gulf Refining Co.

Grinding Balls
Babcock & Wilcox Co.

Grizzlies
American Manganese Steel Co.
Good Roads Machy. Corp.
Jeffrey Mfg. Co. (Vibrating)
Pettibone Mulliken Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Grizzly Feeders
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.

Guards (Wire)
National Wire Cloth Co.

Hammer Drills
Gardner-Denver Co.

Hammer Mills (See Crushers)

Hoists
Allis-Chalmers Mfg. Co.
Gardner-Denver Co.
Ingersoll-Rand Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Gravel Equipt. Mfg. Co.
Vulcan Iron Works

Hose (Water, Steam, Pneumatic and Air Drill)
Ingersoll-Rand Co.

Hydrators
Blaw-Knox Co.
Kritzer Company
Lime & Hydrate Plants Co.
Vulcan Iron Works

Hydrate Plants
Lime & Hydrate Plants Co.

Hydraulic Cement Admixture

Wyodak Chemical Co.

Insulation (Electric)
General Electric Co.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Company, Inc.
Lime & Hydrate Plants Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Vulcan Iron Works

Kilns (Shaft)
Vulcan Iron Works

Kominuters (See Mills)

Laboratory Crushers
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Lime Handling Equipment
Fuller Company
Kritzer Company
Link-Belt Co.

Lime Kilns (See Kilns and Coolers, Rotary)

Lime Plants
Lime & Hydrate Plants Co.

Linings (Iron for Ball and Tube Mills). See Mill Liners)

Loaders and Unloaders
Barber-Greene Co.
Bucyrus-Erie Co.
Fuller Company
Good Roads Machy. Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Robins Conveying Belt Co.

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel)
Fate-Root-Heath Co.
Plymouth Locomotive Works
Vulcan Iron Works

Locomotives (Diesel-Electric)
Fate-Root-Heath Co.
Plymouth Locomotive Works
Vulcan Iron Works

Locomotives (Electric)
Jeffrey Mfg. Co.

Locomotives (Gasoline-Electric)
Fate-Root-Heath Co.
Plymouth Locomotive Works
Vulcan Iron Works

Locomotives (Geared)
Lima Locomotive Works, Inc.
Vulcan Iron Works

Locomotives (Oil Electric)
Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Steam, Gas and Electric)
General Electric Co.
Lima Locomotive Works, Inc.
Plymouth Locomotive Works (Gas)
Vulcan Iron Works

Locomotives (Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.
Vulcan Iron Works

Log Washer
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works

Lubricants
American Steel & Wire Co. (Wire Rope)
Gulf Refining Co.

Machinery Guards
Harrington & King Perforating Co.

Magnets
General Electric Co.

Manganese Steel
Pettibone Mulliken Co.

Manganese Steel Castings
American Manganese Steel Co.
The Frog, Switch & Mfg. Co.
Pettibone Mulliken Co.

Manganese Steel Parts
American Manganese Steel Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Hardinge Company, Inc.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Babcock & Wilcox Co.
Jeffrey Mfg. Co.
F. L. Smidth & Co.

Mine Handling Equipment
Chain Belt Co.

Mixers (Concrete)
Koehring Co., Division of National Equipt. Corp.

Motor Truck Scales
Fairbanks, Morse & Co.

Motors and Generators (Electric Units)
Allis-Chalmers Mfg. Co.
Fairbanks, Morse & Co.
General Electric Co.

Nozzles (Gravel Washing)
Chain Belt Co.

Oil Burners
Babcock & Wilcox Co.

Oils (Lubricating)
Gulf Refining Co.

Ore Jigs
McLanahan & Stone Corp.

Partitions (Wire)
National Wire Cloth Co.

Pavers (Concrete)
Koehring Co., Division of National Equipt. Corp.

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Morrow Mfg. Co.

Plate (Double Corrugated)
Hendrick Mfg. Co.

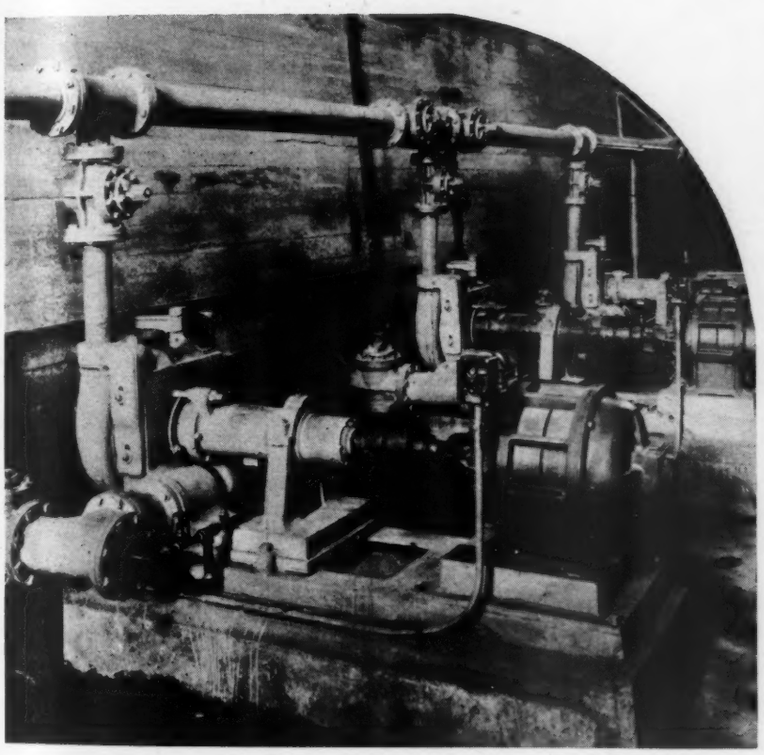
Plates
Cross Engineering Co.

Poidometers
Schaffer Poidometer Co.

WILFLEYS

Assure

LOW COST SLURRY PUMPING



● This is what the composite record of well over sixty wet process cement plants shows.

The reason can be found in the design. Take the non-stuffing box feature which means that maintenance is always at a low figure. This feature alone makes the Wilfley Slurry Pump a good buy. Then there are the extra heavy pumping parts and the 10 to 12 minute change of these parts. These features mean money saved in the handling of slurry.

If you want to lower your manufacturing costs, look into the handling of the slurry. Give consideration to the Wilfley Centrifugal Slurry Pump.

A. R. WILFLEY and SONS, Inc., Denver, Colorado, U. S. A.

NEW YORK OFFICE, 1775 BROADWAY, NEW YORK, N. Y.

CENTRIFUGAL WILFLEY PUMPS

WILFLEY

centrifugal SAND PUMPS

PATENTED

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Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Portable Conveyors
Barber-Greene Co.
Fuller Company
Link-Belt Co.
Robins Conveying Belt Co.

Portable Crushing and Screening Unit
Austin-Western Road Machy. Co.
Good Roads Machy. Corp.
McLanahan & Stone Corp.
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Power Transmission Machinery
Chain Belt Co.
SKF Industries, Inc.

Power Units
Fairbanks, Morse & Co.

Pulverators
Allis-Chalmers Mfg. Co.

Pulverizer Parts
American Manganese Steel Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Dixie Machy. Mfg. Co.
Jeffrey Mfg. Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Air Lift)
Fuller Company
Ingersoll-Rand Co.

Pumps (Cement)
Fuller Company

Pumps (Cement Slurry)
American Manganese Steel Co.
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
Fairbanks, Morse & Co.
Ingersoll-Rand Co.
Kansas City Hay Press Co.
Morris Machine Works
Pettibone Mulliken Co.
A. R. Wilfley & Sons

Pumps (Drainage)
Fairbanks, Morse & Co.

Pumps (Dredging)
American Manganese Steel Co.
Bucyrus-Erie Co.
Morris Machine Works
Pettibone Mulliken Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Kansas City Hay Press Co.
Ingersoll-Rand Co.
Morris Machine Works
Pettibone Mulliken Co.
A. R. Wilfley & Sons

Pumps (Pulverized Coal)
Babcock & Wilcox Co.

Rails
Easton Car & Const. Co.

Railway Equipment
General Electric Co.

Railways (Electric)
General Electric Co.

Ready Mixed Concrete (Truck Mixer Bodies)
Blaw-Knox Co.
Chain Belt Co.

Ready Mixed Concrete Plants
Blaw-Knox Co.

Road Machinery
Barber-Greene Co.
Blaw-Knox Co.
Good Roads Machy. Corp.
Koehring Co., Division of National Equipt. Corp.
Marion Steam Shovel Co.

Rock Bits (See Drill Bits)

Rock Drills (See Drills, Rock)

Rod Mills
Traylor Eng. & Mfg. Co.

Roller Bearings
Easton Car & Const. Co.
SKF Industries, Inc.
Timken Roller Bearing Co.

Roofing and Siding (Steel)
Joseph T. Ryerson & Son, Inc.

Rope, Wire (See Wire Rope)

Rotary Screens (Sections and Segments)
Hendrick Mfg. Co.

Sand Drag
McLanahan & Stone Corp.
Smith Engineering Works

Sand Separators
Pioneer Gravel Equipt. Mfg. Co.

Sand Settling Tanks
Link-Belt Co.
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works

Scales (Automatic Proportioning)
Fairbanks, Morse & Co.
Richardson Scale Co.

Scales (Cement)
Fairbanks, Morse & Co.
Richardson Scale Co.

Scales (Railway Track and Truck)
Fairbanks, Morse & Co.

Scrapers (Power Drag)
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Link-Belt Co.
Pioneer Gravel Equipt. Mfg. Co.

Screens
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Chicago Perforating Co.
Cross Engineering Co.
Good Roads Machy. Corp.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Morrow Mfg. Co.
National Wire Cloth Co.
Nordberg Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Productive Equipment Corp.
John A. Roebling's Sons Co.
Simplicity Eng. Co.
Smith Engineering Works
Robins Conveying Belt Co.
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.
Universal Vibrating Screen Co.

Screens (Perforated)
Hendrick Mfg. Co.

Screens, Scalping (Hercules and Standard)
McLanahan & Stone Corp.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Screens (Testing)
Hendrick Mfg. Co.

Screens (Vibrating)
Allis-Chalmers Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Austin-Western Road Machy. Co.
Nordberg Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Productive Equipment Corp.
McLanahan & Stone Corp.
Simplicity Eng. Co.
Smith Engineering Works
Robins Conveying Belt Co.
Sturtevant Mill Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens, Washing (Hercules, Ajax and Standard)
McLanahan & Stone Corp.
Smith Engineering Works

Screw Rewasher (Single and Twin)
Smith Engineering Works

Scrubbers
Allis-Chalmers Mfg. Co.
Hardinge Company, Inc.
Lewistown Fdy. & Mach. Co.
McLanahan & Stone Corp. (Steel)
Smith Engineering Works

Seal Rings
Traylor Eng. & Mfg. Co.

Separators (Slurry)
F. L. Smidth & Co.

Separators, Air (See Air Separators)

Sheaves
Pettibone Mulliken Co.

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)
Bay City Shovels, Inc. (Convertible)
Bucyrus-Erie Company
Industrial Brownhoist Corp.
Koehring Co., Division of National Equipt. Corp.
Link-Belt Company
Marion Steam Shovel Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Silos
F. L. Smidth & Co.

Sizers (Multi-Roll)
Allis-Chalmers Mfg. Co.

Skip Hoists and Skips
Easton Car & Const. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Vulcan Iron Works

Slings (Wire Rope)
American Steel & Wire Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Speed Reducers
Link-Belt Co.
Traylor Eng. & Mfg. Co.

Sprockets and Chain
American Manganese Steel Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Pettibone Mulliken Co.

Sockets (Wire Rope)
American Steel & Wire Co.

Steam Shovel Repair Parts
American Manganese Steel Co.

Steel Bars
Timken Roller Bearing Co.

Steel (Bars, Shapes, Plates, etc.)
Joseph T. Ryerson & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Stokers
Babcock & Wilcox Co.

Tanks
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Gravel Equipt. Mfg. Co.

Texrope Drives
Allis-Chalmers Mfg. Co.

Tools (Pneumatic)
Ingersoll-Rand Co.

Track Equipment
Easton Car & Const. Co.
Nordberg Mfg. Co.
Pettibone Mulliken Co.

Track Shifters
Nordberg Mfg. Co.

Tractors
Koehring Co., Division of National Equipt. Corp.
Kansas City Hay Press Co.

Tramways (Aerial Wire Rope)
American Steel & Wire Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Transmission Belting (See Belting)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Kritzer Company
Timken Roller Bearing Co.

Trenchers
Barber-Greene Co.

Trippers
Robins Conveying Belt Co.

Troughs
Cross Engineering Co.

Truck Bodies (Quarry)
Easton Car & Const. Co.

Truck Bodies (Ready Mixed Concrete)
Blaw-Knox Co.

Trucks (Mixing)
Blaw-Knox Co.

Trukmixers
Blaw-Knox Co.

Turntables
Easton Car & Const. Co.

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

Tubing (Seamless Steel)
Timken Roller Bearing Co.

Underground Shovels
Nordberg Mfg. Co.

Vibrating Screens (See Screens, Vibrating)

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Eagle Iron Works
Hardinge Company, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Gravel Equipt. Mfg. Co.
Traylor Eng. & Mfg. Co.

Welding and Cutting Apparatus
General Electric Co.

Weighing Equipment
Fairbanks, Morse & Co.
Merrick Scale Mfg. Co. (Automatic Proportioning)
Richardson Scale Co.
Schaffer Poidometer Co.

Weigh-Mix
Koehring Co., Division of National Equipt. Corp.

Welding Rod
American Steel & Wire Co.
Joseph T. Ryerson & Son, Inc.

Welding Wire
American Steel & Wire Co.
John A. Roebling's Sons Co.

Wheels (Car)
American Manganese Steel Co.
Easton Car & Const. Co.
Pettibone Mulliken Co.

Wire (Rubber Insulated)
American Steel & Wire Co.

Wire Rope Sockets (See Sockets, Wire Rope)

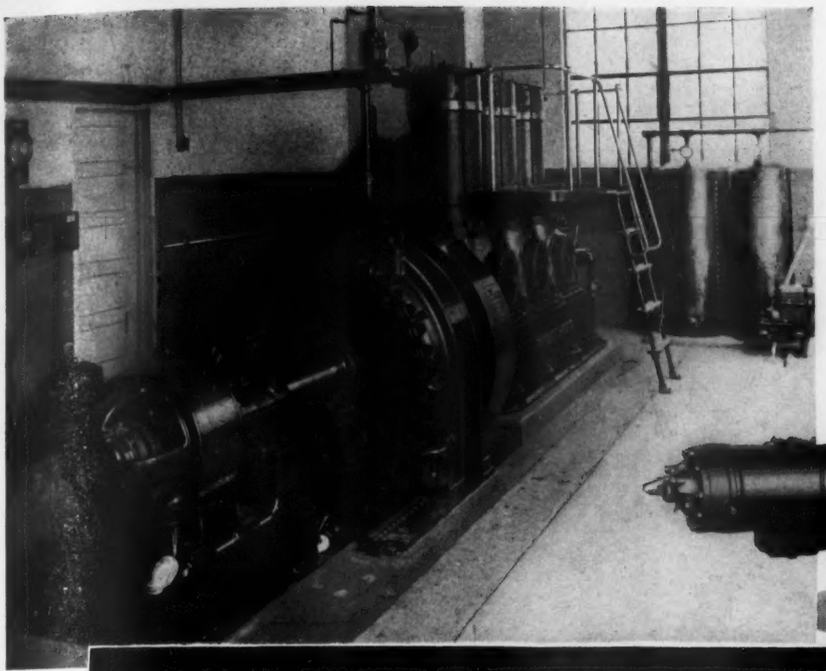
Wire Cloth
National Wire Cloth Co.
John A. Roebling's Sons Co.

Wire Rope
American Steel & Wire Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Wire Rope Fittings
American Steel & Wire Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

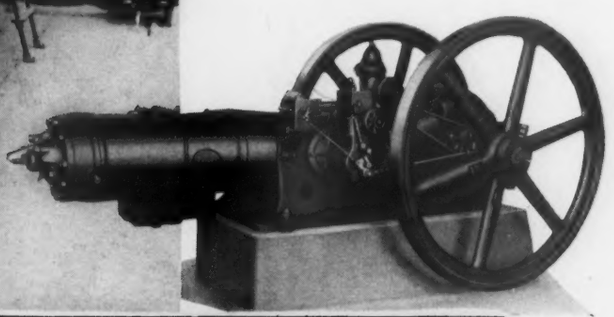
Wire Rope Slings (See Slings, Wire Rope)

Rock Products reaches more plants than any other paper



This 165-h.p. F-M Diesel saved its owners $2,851.17 in 8 months.

A 90-h.p. low-cost F-M oil engine designed for service in smaller plants.



You may not realize it . . . But you ARE in the Power Business!

Power is a large item in the cost of the products shipped from your plant. In the prices at which you sell your product you include the cost of that power. Thus you are selling power—and you are in the power business.

Then why not make as much money out of it as possible?

The market price determines your selling price—but your profit is determined by how low you can buy it.

You can buy power cheaper!

Modern F-M Diesels are in scores of plants cutting power costs and increasing profits. Whether you now purchase power or have your own plant, F-M Diesels can cut power costs. The reason is simple: Diesel fuel costs less and F-M Diesels convert more fuel energy units into usable power.

The story giving facts and figures at other plants—the dollars saved each year—will be sent you by return mail if you address Fairbanks-Morse & Co., 900 S. Wabash Ave., Chicago, Illinois. 32 branches at your service throughout the United States.

Pioneer Designers and Manufacturers of POWER 104 Years

FAIRBANKS-MORSE

DIESEL ENGINES

POWER PUMPING AND WEIGHING EQUIPMENT

6018-OA 22.21

PUBLIC NOTICE

The undersigned calls attention of the industry to United States Patent No. 1954211, issued April 10, 1934, to W. J. Kuntz, twenty claims covering Process of treating lime and manufacture of hydrated lime:

United States Patent No. 1929591, issued Oct. 10, 1933, to W. J. Kuntz, four claims covering treating of lime and hydration of lime.

United States Patent No. 1915322, issued June 27, 1933, to W. J. Kuntz, eleven claims covering the continuous feeding and discharge shaft lime kiln.

Features of Patent No. 1954211, The Kuntz System of Lime Hydration and Separation was illustrated and fully described in Rock Products May 23, 1931. More than fifty plants installed.

Full information about the Kuntz Automatic Shaft Lime Kiln will be furnished on application.

Inquiries are solicited for complete lime plants. Lime plants reconstructed to embody the features of above patents. Your plant analyzed on request.

All processes patented in U. S. A., Canada and principal countries of the world.

"Ask the User of Kuntz Systems."

LIME AND HYDRATE PLANTS CO.

Office: **YORK, PENNA.**

MANUFACTURER OF LIME KILNS, HYDRATORS, ROTARY DRYERS, ETC. • *DESIGNER AND BUILDER OF COMPLETE LIME AND HYDRATE PLANTS*

Works: York, Pennsylvania Chicago, Illinois Belleville, Ont., Canada London, England

DIXIE

NON-CLOG HAMMER MILL

Nothing to conceal here—look into this construction—note the rugged simplicity — the scientific designing and safeguards against wear — breakage and stalling. That breaker plate with 26 times average wearing area — there's something worth considering.

Think of the saving in dollars and cents there alone. You'll get large capacity at low operating cost and you can choose from 40 sizes—in any capacity —Primary—Secondary or Fine Reduction.

Write for details.

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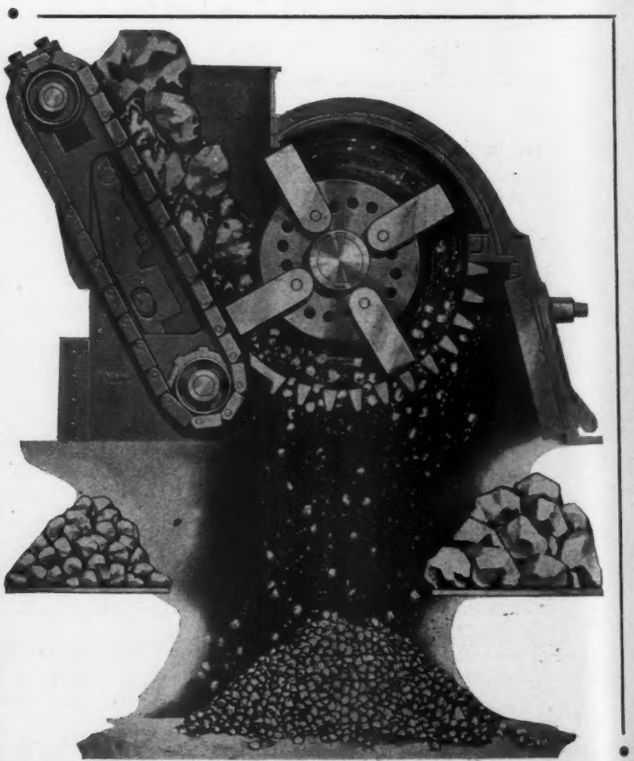
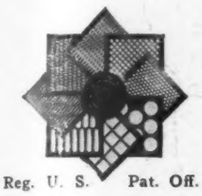
MOGUL



DIXIE MACHINERY MFG. COMPANY
4209 Goodfellow Ave. St. Louis, Missouri

To *Help You* do a BETTER, LOWER COST *Screening Job in 1935*

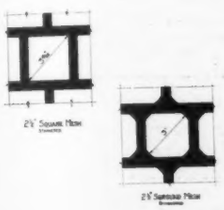
Pioneers in the perforating of metal for screening purposes, Hendrick offers a complete line for the Quarry operator:



Reg. U. S. Pat. Off.

—Hendrick Double Corrugated Plate—heat-treated for longer wear—developed especially for vibrating screens; furnished in square and round mesh, also in the new Hendrick "Sqround"* Mesh.

—Perforated plate of every type, rolled or flat, in high carbon and abrasive resisting steels, in standard and special perforations, for rotary, shaking and vibrating screens.



—"Sqround" Mesh, the new Hendrick perforation which combines the advantages of square and round mesh. Furnished in flat plate and in Hendrick Double Corrugated Plate.

—Revolving Screen Sections, in any gauge, metal, and size of opening.

—Elevator Buckets made to Hendrick standards.

If you haven't a copy of the Hendrick Perforated Metals Handbook, write for a copy today—you'll find it a good buyer's guide for 1935.

*Registered United States Patent Office

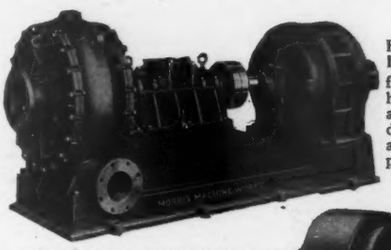
HENDRICK MFG. CO.

47 Dundaff Street, Carbondale, Pa.

Baltimore Birmingham Boston
Cincinnati Cleveland Detroit Hazleton
New York Philadelphia Pittsburgh

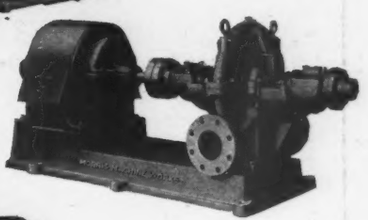
Manufacturers of Mitco Armorgrids, Mitco Open Steel Flooring, Mitco Shur-Site Treads and Light and Heavy Steel Plate Construction.

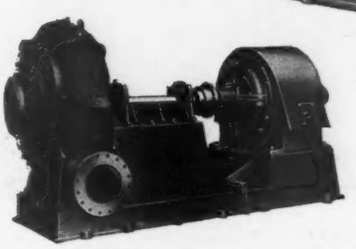
When new pumping equipment is to be purchased



HEAVY DUTY DREDGING PUMP
for economical pumping of highly abrasive solids against high heads. Large diameter for low speed, and special materials for parts subject to wear.

GENERAL SERVICE PUMP
The wide range of impellers available for these pumps permits operation at suitable speed with maximum efficiency.





LINED DREDGING PUMP
for handling heavy or sharply abrasive sand and gravel. Special alloy linings save in replacement expense.

YOU will want to know not only the cost but the complete background of the pumps that are offered—their design, workmanship, previous performance and company responsibility.

The results of your investigation of Morris Pumps for dredging or sand and gravel plant service are sure to prove highly satisfactory. Morris, the originator and first American manufacturer of centrifugal pumps, has an unmatched experience of almost 70 years covering every type of pumping service. The present-day design of Morris Pumps reflects this experience through many special features that have proven to promote exceptionally high efficiency and durability. Morris Pump performance has won the hearty commendation of plant officials all over the country because of the thoroughly dependable and trouble-free operation which uniformly characterizes each Morris installation. Finally, the unwavering policy of standing squarely back of each Morris Pump, which has been faithfully followed throughout the long history of the Morris organization, assures fair dealing in every respect.

You will be safe in specifying Morris Pumps for every abrasive-handling and general service. Send the coupon today for catalogues describing Morris pump designs for services in which you are interested.

Established 1864

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MORRIS MACHINE WORKS, Baldwinsville, N. Y.
Please send copy of catalogue describing Morris Pumps for the following service:.....

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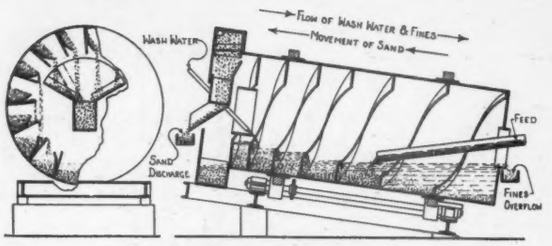
Position .....

Address .....

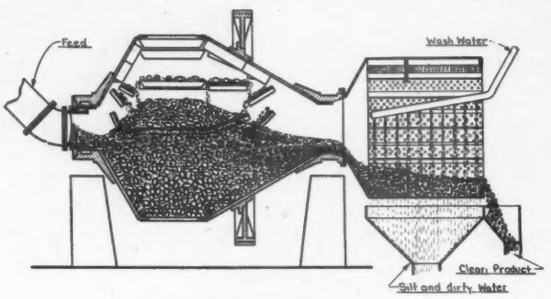
R. P. 1-35

HARDINGE



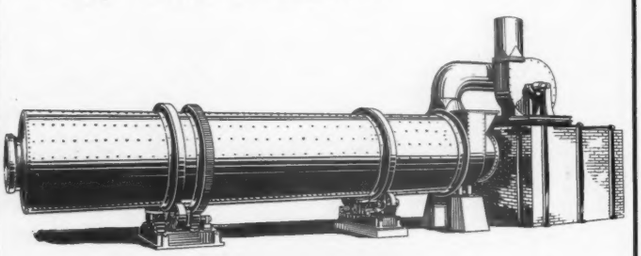
WASHERS

The only non-clogging washer made. No moving parts except outer shell. Exceptionally clean sand produced. Write for Bulletin No. 39.



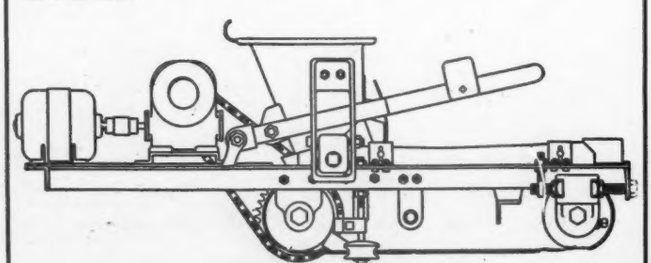
SCRUBBERS

Stone—Gravel—Sand cleaned by mass contact. The weight of the mass literally scours the product free of all foreign matter. No internal moving parts. Write for Bulletin No. 37.



DRYERS

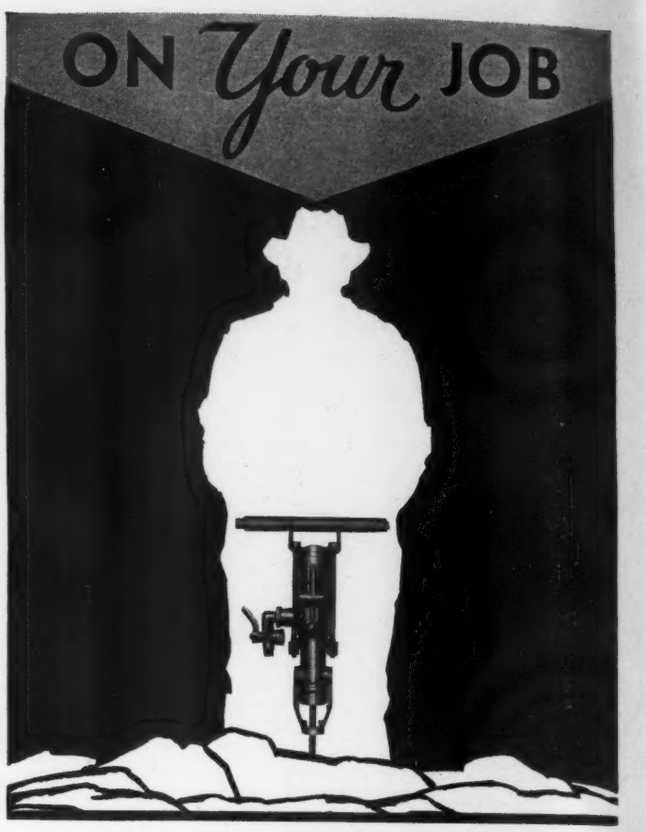
The **Ruggles Coles Dryer** is the most widely used Rotary Dryer in the industry for drying stone—sand—clays and coal. Write for Bulletin No. 16B.



FEEDERS

For feeding—by weight or volume—proportioning—mixing—weighing or recording. Write for Bulletin No. 33C.

HARDINGE COMPANY
INCORPORATED
YORK, PA.—Main Office & Works
New York—122 E. 42nd St.
Chicago—205 W. Wacker Drive
San Francisco—444 Market St.



—is where you'll find out why the NEW Gardner-Denver S-35 is the preferred drill for block-holing

Anybody can talk about a rock drill. But if you want to KNOW why the new Gardner-Denver S-35 is a better drill for block-holing, put one to work on your own jobs! At the right are some of the things you'll find out.

GARDNER-DENVER COMPANY
102 Williamson St., Quincy, Ill.

Exceptionally light in weight —28 pounds—easy handling in places inaccessible to a heavier drill

●

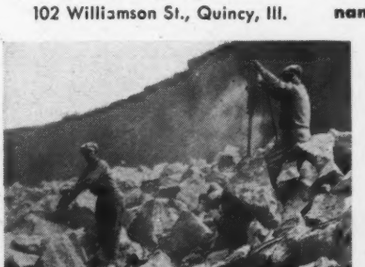
Amazingly free from vibration because of its perfectly synchronized valve action—low air consumption

●

Leaves the hole clean because of its powerful blowing device

●

Built sturdier in every part to cut down your maintenance costs.



Get the facts FIRST-HAND. When can we show you the S-35 in action?

●

S-35 Sinker in Missouri quarry

Horizontal, Vertical, Air-Cooled and Portable Compressors • Steam and Power Pumps • Rock Drills, Accessories • Paving Breakers • Clay Diggers • Hoists

GARDNER-DENVER
MAKES AIR DO MORE AND COST LESS

NEVER BURST

IMPROVED MULTI-WALL

A neater, cleaner, stronger, more desirable bag that can be filled in less time and sealed against moisture and leakage. The Chase Bag is easier to open and empties out clean. It stands rough handling—stacks evenly and is a real silent salesman and Good-Will builder. Many leading brands of cement are being shipped in Chase Improved Type Multi-Wall Bags.

Send for full details.

ESTABLISHED 1847

CHASE BAG CO.

TOLEDO, OHIO

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SALES OFFICES

Chicago, Detroit, New York, Hutchinson, Kan., San Francisco, Los Angeles, Orlando, Fla., Charleston, S. C., Cleveland, Denver, Memphis

Convertible Shovel-Crane, owned by Mayer Pollock, on high-lift shovel work.

"FIRST CLASS... in every way"

Mayer Pollock of Pottstown, Pa., bought their first Industrial Brownhoist 25 years ago. Economies effected by it led to additional purchases and today they own six! Why? Let them tell you in their own words. "We find that your cranes are first class in workmanship in every way, giving us little trouble and expense, and they are economical in operation and upkeep."

This user's experience and opinion of Industrial Brownhoists is typical. Positive proof of this is that far more Industrial Brownhoist cranes have been purchased than any other make.

If you are skeptical as to whether a good locomotive or crawler crane will more than just pay out for you, let an Industrial Brownhoist sales engineer tell you what these cranes will do. Make him prove his case. Then, having the facts, you be the judge.

INDUSTRIAL BROWNHOIST CORPORATION

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District Offices: New York, Philadelphia, Chicago, Cleveland

INDUSTRIAL BROWNHOIST

THE COMPLETE LINE OF LOCOMOTIVE AND CRAWLER CRANES

SHAY GEARED LOCOMOTIVES

---Built for Quarry Service!

THERE'S no question about the adaptability of Shay Geared Locomotives to quarry service. They are built for it.

Shay Geared Locomotives are rugged. This fits them to withstand abuse and to give continuous, dependable operation under the most severe conditions.

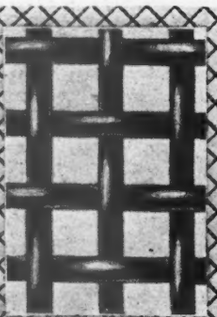
Shay Geared Locomotives have great power. Their three-cylinder engines start heavy loads quickly and pull them up hard-to-climb grades without difficulty or delay. Speedier car movement keeps quarry production at a maximum.

Because of these advantages . . . and others we will gladly tell you about . . . the Shay is the most reliable locomotive investment you can make. Write for catalog.

LIMA LOCOMOTIVE WORKS, Incorporated
LIMA, OHIO
Sales Office: 60 E. 42nd St., New York, N. Y.

START THE YEAR WITH MORE PROFITS

Resolve *NOW* to use *NATIONAL WIRE CLOTH*. Facts bear out every claim made for it. Users everywhere are enthusiastic over the many advantages gained since their adoption of this more durable wire cloth.



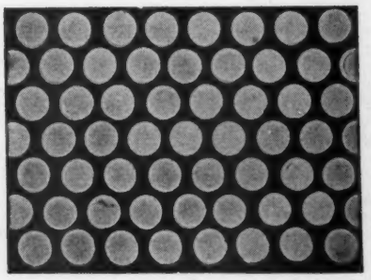
National Wire Cloth

Lasts five times as long as cloth made of ordinary steel. It retains absolute accuracy throughout its life. Wires cannot shift. Wears nearly as long as Manganese but costs only a fraction as much. Will not sag under heavy loads and will not crystallize regardless of vibration.

We can make immediate shipments at money-saving prices.

NATIONAL WIRE CLOTH CO.
FOOT OF BELLE STREET, ST. PAUL, MINN.

MORROW SCREEN PLATES

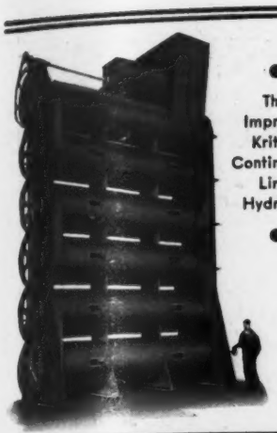


MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

Prices are right.
Send for Bulletin 57.

The Morrow Manufacturing Co.
Wellston, Ohio



The Improved Kritzer Continuous Lime Hydrator

A LARGE HYDRATOR

BY KRITZER

The new KRITZER CONTINUOUS HYDRATOR, with a normal capacity of 10 tons per hour, establishes a new standard for the hydrating industry.

Six massive cylinders with individual paddle action coupled with the newly developed PREHYDRATOR assures a fine quality hydrate with large capacity production.

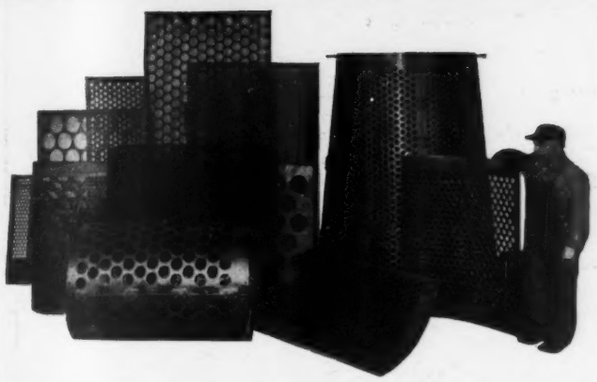
QUANTITY PRODUCTION-A CHEMICAL HYDRATE

Whether you require 2 TONS or 10 TONS of hydrate per hour THE KRITZER COMPANY, with thirty years of experience can meet the most exacting demands of your trade for you.

THE KRITZER COMPANY

515 W. 35TH STREET CHICAGO, U. S. A.

SCREENS of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

The Harrington & King PERFORATING Co.

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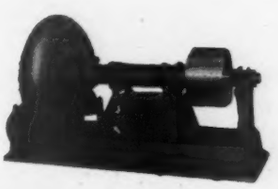
LIGHTNING

Heavy-Duty (Ball-Bearing) Sand and Gravel PUMPS

Built in several sizes —each one a masterpiece in high efficiency. Built like a watch.

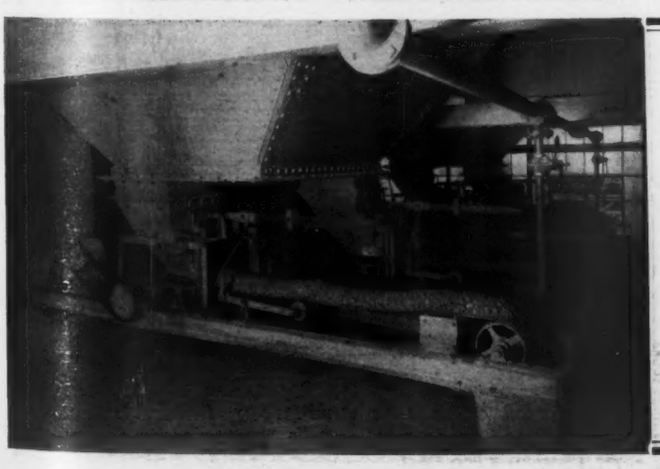
Because of precision workmanship LIGHTNING PUMPS can be operated under extreme high heads without heating or wearing out bearings or any other part.



Ask for Complete Folder.

KANSAS CITY HAY PRESS CO.

Kansas City, Mo.



99% ACCURATE

SCHAFFER POIDOMETERS are guaranteed to be not less than 99% accurate in the weighing and proportioning of material. They are automatic in action, self-contained and operate on a continuous basis. However, where batch operation is desired, our mechanical weigh-master attachment upon being set for a predetermined amount, causes the machine to stop when this amount has been delivered.

Our illustration shows a Battery of Poidometers Proportioning Raw and Finish Material at Birmingham, Alabama, Plant of Alpha Portland Cement Co.

Write for Catalogue No. Two.

SCHAFFER POIDOMETER CO.

2818 Smallman St. PITTSBURGH, PA.

HAYWARD BUCKETS

A PROFIT ON EVERY JOB

Using Hayward Buckets exclusively is your best bet for making a profit on all digging and rehandling jobs.

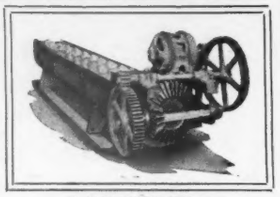
THE HAYWARD COMPANY
202-204 Fulton St.,
New York, N. Y.

MANGANESE STEEL CASTINGS
for the
Rock Products Industry

On Your Next Inquiry Specify
"INDIAN BRAND"
Known For Its Superior Shock and Wear Resisting Qualities.

The Frog, Switch & Mfg. Co.
Established 1881 Carlisle, Pa.

Why ship dirty stone when it can be made clean easily and ecomically? This scrubber will do the good work.



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State Capacity Required!

LEWISTOWN FOUNDRY & MACHINE CO.

Mfrs. of SandCrushing, Grinding, Washing and Drying Machinery

LEWISTOWN - - - - - - PENNA.

FASTER DIGGERS!

Less cable overhaul and super-digging power of Williams "Champion" Buckets are features that save crane time and add to your profit per job.

WILLIAMS
• BUCKETS •

Write for bulletin

The Wellman Engineering Co.
7008 Central Ave.
Cleveland, Ohio

Perforated Metals—Screens of All Kinds—For Sand, Gravel, Stone, Etc.

MATERIAL IN STOCK
PROMPT SHIPMENT

CHICAGO PERFORATING CO.
2427 to 2445 West 24th Place
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LIMA

SHOVELS-CRANES-CLAMSHELLS-DRAGLINES
3-4yd.,1yd.,11-4yd.,11-2yd.,13-4yd. and 2-yd.
(A TYPE AND SIZE FOR EVERY JOB)

LIMA LOCOMOTIVE WORKS, Inc.
SHOVEL AND CRANE DIVISION
Lima, Ohio, U. S. A.

PRODUCE HIGH STRENGTH AND ALL TYPES OF MASONRY

CEMENTS

by the new process!

Inquiries invited from producers of cement, lime and allied products.

CEMENT PROCESS CORP.
P. O. Box 515 Mexico City, Mexico
All processes patented in U. S. and other countries.

THE editorial library of Rock Products contains practically every obtainable treatise relating to the production of stone, sand, silica, phosphate rock, gypsum and other nonmetallic minerals and on the manufacture of cement, lime, gypsum products, etc.. The editors are technical men and are familiar with these books. Our library of manufacturers' literature is as complete and up-to-date as possible. Rock Products welcomes inquiries, and our facilities are ever at the disposal of our subscribers and advertisers.

Complete Plants Designed and Equipped.
Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment.
Engineering Service.

EARLE C. BACON, Inc.
17 JOHN STREET NEW YORK, N. Y.

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IMMEDIATE SHIPMENT FROM STOCK FOR MAINTENANCE AND REPAIR

When steel is needed in a hurry . . . you can depend upon Ryerson for quick action. Complete stocks of all steel products including bars, plates, sheets, structurals; bolts and nuts, rivets, boiler fittings, chain, etc. Order from the nearest plant. Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON

WYO-BOND
SELECTED WYOMING
BENTONITE

Especially prepared for Hydraulic Cements and their products. Samples gladly furnished upon request.

THE WYODAK CHEMICAL COMPANY
Main Office: P. O. Station D, Cleveland, Ohio
Mines and Refineries: Jerome, Wyoming
Stocks Carried at
Chicago, Houston, Oakland, Calif., Minneapolis, Cleveland, Milwaukee, Detroit, St. Louis

MERRICK
WEIGHTOMETERS

Safeguarding the proportioning of material at plant of the Minnesota Mining & Mfg. Co., Wausau, Wis. Since the original installation, an additional machine has been shipped to this company.

We will be pleased to help plan installations to meet your specific requirements.

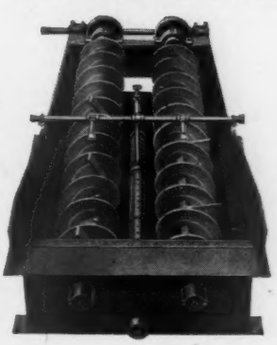
MERRICK SCALE MFG. CO.
178 AUTUMN STREET PASSAIC, N. J.

SHOVELS—DRAGLINES—CRANES—TRENCH HOES

9 Sizes
⅜ to 1¼ cu. yds.

BAY CITY SHOVELS, Inc., Bay City, Mich.

EAGLE WASHERS



Single and Double
Spiral Screw and Log Type

Guaranteed removal of trash, sticks, leaves, coal, silt, mud-balls,—to the difficult clay-balls and iron oxide conglomerates.

EAGLE IRON WORKS
Des Moines, Iowa

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED — POSITIONS VACANT—two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

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Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED — Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

Used Equipment for Sale

CARS
12-Yd. Western Air, also Hand Dump Cars, Flats, Gondolas, Steel Hopper Cars, Box Cars, Locomotives.
HYMAN-MICHAELS COMPANY
20 N. Wacker Dr. Bldg., Chicago, Ill.
Railway Exch. Bldg. St. Louis, Mo. 101 West 31st St. New York

Fairbanks-Morse 15-ton Truck Scale. Haiss Gasoline Loader. Kennedy Van Saun 10" Primary Crusher. Good Roads—Climax 12" by 24" Jaw Crusher. 36" by 18" Rotary Screen. 8" Centrifugal Suction Pump. Four —2 50 H.P., 1 40 H.P., 1 25 H.P. Electric Motors, excellent condition, no reasonable offer refused.
Standard Concrete Products Co., Inc., York, Pa.

DRAGLINE
Diesel-Electric, 3½-4 Yd.
Bucyrus Class 24, with 115'-100' boom. Complete, including two buckets, etc. Condition first-class. Price attractive.
HUTCHINSON & OAKFORD
424 California Ave. Peoria, Ill.

(Classified Advertising Continued on Next Page)

CLASSIFIED ADVERTISEMENTS

Used Equipment For Sale

Iron & Steel Products, Inc.

All Phones: Harrison 0163—5 Lines.
RAILWAY EXCHANGE, CHICAGO
Buyers, Sellers, Traders.
A. R. A. Limits Rigidly Followed.

1935 BARGAINS!!

2—50-ton Baldwin type 0-6-0 Switch Engines, S.G.
1—25-ton Vulcan 4-driver Saddle Tank Engine, S.G.
1—15-ton Vulcan 4-driver Saddle Tank Engine, S.G.
1—25-ton Davenport, oil-burning Saddle Tank Engine, S.G.
1—Goodman, type 48, Electric Hydraulic Underground Shovel, Crawler type.
1—40-ton Standard 8-wheel Brownhoist Locomotive Crane.
1—30-ton Standard 8-wheel Browning Locomotive Crane, with 60' Boom.
28—20-yard Koppel Air-operated Steel Dump Cars.
50—50-ton Steel Hopper Cars.
200 tons NEW 7/8" Steel Plates.
10 Tons NEW 1 1/8" Steel Rivets.
1—15-ton Brownhoist Locomotive Crane.
1—Broad Gauge Link Belt Electric Crane, 100' boom, 5-yd. bucket.
2—80-CF Hulett Ore Buckets.
3—1½-yard Brown Ore Buckets.
2—8'0" x 125'0" Reeves Rotary Kilns.
1—6'0" x 65'0" Rotary Dryer (with stack).
1—52" x 40' Rotary Dryer.
2—60' x 6' Rotary Kilns complete.
7—5'0" x 22'0" Smidth Ball Mills.
2—Sturtevant Rotary Mills.
2—33" Fuller Mills.
2—85" x 8'0" Smidth Kominuters.
2—No. 8 Allis-Chalmers Ball Mills.
2—Brand New 9½'-8'-40' Allis-Chalmers Compeb Mills.
1—8 x 30" Hardinge Conical Ball Mill.
1—No. 12 Allis-Chalmers Gyratory Crusher.
1—10" Allis-Chalmers Fine Reduction Crusher.
1—No. 4 Allis-Chalmers Gyratory Crusher, manganese fitted.
1—Set Allis-Chalmers Anaconda type Crushing Rolls, size 54" x 20".
1—Model No. 460 Marion Electric Caterpillar Shovel, 1½ Cu. Yd.
3500 H.P. Motors from 3 to 200 H.P., 3-60-440 volts, complete with starters, compensators, etc.
1—250 K. W. and 1—200 K. W. 440-3-60 belt-driven Generators.
2—Pennsylvania 7-S Hammer Mills, for coal or coke breaking.
1—No. 4 Williams Standard Hammer Mill.
2—36" x 48" Link Belt Coal Crushers, with or without power.
SPECIAL (New Parts) for 11'6" and 7'6" dia. Kilns or Dryers (Vulcan).

FOR SALE

10-inch pump with direct connected 750 R.P.M. Motor, swintex digger with 35-foot ladder, dredge complete with steel tanks.

Manning & Locklin Pontiac Co.
505 Lincoln Bldg. Detroit, Mich.

RESPONSIBILITY!

1—8'8x85' Ruggles-Coles Class A Rotary Dryer.
5—4x20, 5x26, 5x30, 6x35, same type.
3—3 and 5 roll Raymond High-Side Mills.
1—5 roll Raymond Low-Side Mill.
3—6'x35' Rotary Steam Tube Dryers.
1—No. 2 Sturtevant Ring Roll Mill with 10' separator, elevator, complete.
5—Air Classifiers, 30", 10', 12', 14'.
1—7"x24" Sturtevant Jaw Crusher, set to ½".
1—36"x36". 4XC Gruendler Swing Hammer Mill.
1—36"x24" Jeffrey, Type D Hammer Mill.
4—Symons Cone Crushers, 4', 5½', 7'.
12—Crushing Rolls, 16x10, 20x14, 36x16 Sturtevant; 30x10 Colorado Iron Works; 36x16, 42x16 Allis-Chalmers; 36x16, 42x16 Traylor.
3—4x10, 5x10 Allis-Chalmers Rod Mills.
12—6", 8", 10" Dayton Dowd Centrifugal Pumps, all 3-stage, with 200 and 400 H.P. A.C. motors.
1—8'x12' Oliver Rotary Continuous Filter.
1—24"x72" Magnetic Pulley, complete.
10—Hardinge Ball Mills, 3'x8", 4½x16, 5x22, 6x22, 6x36, 7x36, 8x22, 8x30, 8x48, 8x72.

Send for latest Consolidated News listing all sizes, types Jaw, Gyratory and Roll Crushers, Rotary and Vibrating Screens, Air Compressors, Swing Hammer Mills, Elevators, Conveyors, Rotary Kilns and Dryers, Ball, Rod and Tube Mills; Hardinge Ball and Pebble Mills; Raymond and other fine Pulverizers, Air Classifiers, Thickeners, Wet Classifiers, Filter Presses, Continuous Filters, Shovels and Cranes, etc.

CONSOLIDATED PRODUCTS CO., INC.
17-19 Park Row, New York City Barclay 7-0600
Shops and Yards at Newark, N. J., cover six acres.
WE WILL BUY YOUR SURPLUS MACHINERY.

FOR SALE

12—5-yd. 36" ga. Western Dump Cars.
6—2-yd. 36" ga. Koppel Steel V Dump Cars.
4—1½-yd. 36" ga. Insley Steel V Dump Cars.
2—3½-ton 36" ga. Whitcomb Gasoline Locomotives.
1—9x10 Sturtevant Vertical Steam Engine.
1—10x10x12 Ingersoll Steam-Driven Air Compressor.
1—9x10 Lidgerwood 3-Drum Steam Hoist.
1—8¼x8 Lidgerwood S.D. Steam Hoist.
22—12-yd. Western std. ga. Air or Hand Dump Cars.
2—40-ton Baldwin S.T. Locomotives, 14x22 cyls.
Rails—First-Class Relay Rails and Bars, 60, 70, 80, 85, 90 and 100 lb. Rails, Tie Plates, etc.

HYMAN-MICHAELS CO.
20 N. Wacker Dr. Bldg., Chicago
Railway Exchange Bldg. St. Louis, Mo. 101 West 31st St. New York

FOR SALE

Having just removed tracks from our quarry we have the following equipment to offer at bargain prices.
Approximately 20 tons, 20-pound rail.
20—2-way made up steel switches.
3—3-way made up steel switches.
1—Fordson Tractor.
1—Walker & Elliott Rotary Crusher.
1—A. S. Cameron Pump, complete with 15 HP. motor direct connected.
1—18" stone bucket elevator, 70 ft. centers now operating and in first class condition, available very soon, replacing with larger one, complete with frame and V-belt drive. Also 4x15 Rotary Screen complete with drive now working with above elevator. Bargain.

G. & W. H. CORSON
Plymouth Meeting, Penna.

Gruendler 3-X-C Swing Hammer Mill, 30" Diameter—30" in Width

FOR SALE

An ideal mill for grinding agricultural limestone or can be used as a secondary crusher for producing road stone, chips, etc. SKF roller-bearing equipped. In excellent condition. Will sacrifice for one-third of its original cost. Located in Southern Ohio. **Address Box 650, care of Rock Products, 330 South Wells Street, Chicago, Ill.**

1—2-yd. MARION 480 Shovel-Crane.
1—2-yd. Bucyrus 50B Shovel.
1—1¼-yd. BYERS Crane.
1—1-yd. OSGOOD Shovel-crane.
1—1-yd. KOEHRING Crane.
1—1-yd. P. & H. 600 Shovel.
1—¾-yd. P. & H. Shovel-crane.
1—½-yd. BYERS Shovel-crane.
30—4-yd. Heavy Steel Stone Skips.
1—265-ft. Gas Portable Compressor and Jackhammers.
Electric Draglines, 2- and 3-yd.
Gasoline Draglines, ½- and ¾-yd.
1—BROWNING Truck-crane.
24" Conveyor 65 and 170 ft.
Clamshell Buckets, ½ to 1½ yd.
Crushers 10x18; 15x38; 18x30; 11x26; 12x20.

J. T. WALSH
500 Brisbane Bldg., Buffalo, N. Y.

SLIGHTLY USED

I have exceptional bargains in slighty-used and new equipment located thr ughout Canada and the United States. Let me know what you need no matter what it is, and I will quote on all suitable items I have in your territory. Some of the items available (many sizes, types and makes) are:

BARGES	DERRICKS	MILLS
BOATS	DRAGLINES	MIXERS
BUCKETS	DREDGES	MOTORS
BOILERS	DRILLS	PULVERIZERS
CABLEWAYS	ENGINES	PIPE
CARS	EXCAVATORS	PUMPS
COMPRESSORS	ELEVATORS	RAIL
CONVEYORS	HOISTS	SCALES
CHANNELERS	GENERATORS	SLACKLINES
CRANES	KILNS	SHOVELS
CRUSHERS	LOADERS	TRACTORS
DRYERS	LOCOMOTIVES	ETC.

I Can Sell Your Surplus Equipment

ALEXANDER T. McLEOD
7229 Rogers Ave., CHICAGO, ILL.

Marion Gas Electric ¾-Yard Shovel.
1-Yd. Osgood Crawler Shovel, rebuilt.
Side and Center dump cars.
Locomotives—75-ton Switcher, code boiler—saddle tank type, 18 to 65 tons.
Cranes and Draglines, various sizes.

SOUTHERN IRON & EQUIPMENT CO.
Atlanta, Georgia

Drag Scraper and Slackline Bargains

3—½ yd. Drag Scraper outfits (gasoline powered) ..... $250.00 up
1—¾ yd. Drag Scraper outfit (gasoline powered) $500.00
1—¾ yd. Slackline outfit (gasoline powered) $750.00
1—1 yd. Slackline outfit (gasoline powered) $1,100.00
Other sizes in belt and steam hoists.
S. O. Nafziger, 159 N. State St., Chicago

CLASSIFIED ADVERTISEMENTS

USED EQUIPMENT

FOR SALE

JAW CRUSHERS — 7"x11" - 8"x14" - 9"x15" - 10"x16" - 6"x20" - 11"x22" - 12"x24" - 13"x30" - 15"x30" - 18"x30" - 18"x36" - 20"x50" - 28"x36" - 30"x30" - 26"x42" - 36"x48" - 42"x60" - 42"x48".
Crushing Rolls—16"x10" up to 54"x64".
Gyratory Crushers—From No. 2 up to No. 12.
No. 0-No. 1 and No. 7 ring roll mills.
No. 1—No. 1½ and No. 2 rotary fine crushers.
Swing hammer mills.
3'x25'-4'x30'-5'x50'-5½'x40'-6'x50' and 8½'x75' direct heat rotary dryers.
4'x30' - 4½'x26' - 5'x30' semi-indirect heat rotary dryers.
Indirect heat and steam heated air rotary dryers.
Rotary cement kilns 3' to 8' diameter.
Hardinge-Marcy and Fuller-Lehigh mills.
No. 1, No. 0 and No. 00 Raymond Mills.
One 6'x8' Traylor ball mill.
5'x12' and 4'x10' rod mills.
Tube mills from 4' to 6' in diameter.
8' and 10' air separators.
Hummer - Sturtevant - Gyrex and Niagara screens.
Hoist—Air compressors—Cranes & Shovels.

W. P. HEINEKEN
95 Liberty St., New York Tel. Barclay 7-7298

Cars and Locomotives

33—Western 5-yd. 36" gauge Heavy duty type 2-way side dump cars; modern; box-doors — GENUINE BARGAIN—These cars must be removed IMMEDIATELY from present location—Hamilton, Ohio.

2—Whitcomb — 30-ton, Standard gauge gasoline Switching Locomotives, located in Pittsburgh Vicinity.

In our Birmingham Stock we have the finest lot of STEAM LOCOMOTIVES; saddle tanks and switchers; to be found in the United States.

BIRMINGHAM RAIL & LOCOMOTIVE CO.
Birmingham Alabama

FOR SALE

Bridge Crane—300' bucket travel, 5 ton. AC.
Asphalt Plants—Misc. sizes. Port. & sta. types.
Buckets—All types & sizes. 2½ yd. Omaha—$250.
Compressor—600' Diesel. Others 50'-5000' cap.
Dump Cars—1½-30 yds., inc. steel Quarry Cars.
Crushers & Pulverizers—All sizes. Gyratory, Jaw, Reduction, Rolls, Ball & Hammer Mills.
Raymond Mill—5-roll low side. Late model & A-1.
Hammer Mill—8-15 tons ags. per hr. A-1. $550.
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